



**TOWARDS A KNOWLEDGE SHARING  
FRAMEWORK BASED ON STUDENT  
QUESTIONS:**

**THE CASE FOR A DYNAMIC FAQ  
ENVIRONMENT**

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*Thesis Submitted  
for the Degree of Doctor of Philosophy  
to the Department of Information Systems  
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TOWARDS A KNOWLEDGE  
SHARING FRAMEWORK BASED  
ON STUDENT QUESTIONS: THE  
CASE FOR A DYNAMIC FAQ  
ENVIRONMENT

by

DICK NG'AMBI

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requirements for the degree of

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***Declaration***

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.....  
Dick Ng'ambi



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Finally, “this is the Lord's doing; and it is marvellous in our eyes” Ps 118:23.

To God be ALL the Glory.



## Abstract

This study investigates the impact of anonymous computer mediated interaction on question-driven knowledge acquisition among students. A growing concern for educational institutions in general and educators in particular has been to augment what students are formally taught and what they informally learn from one another. Anecdotal evidence suggests that students consult one another informally. However, informal consultations suffer from three limitations: a) they are limited to clusters of friends; b) shared information is not retained; c) educators have no access to informal knowledge. My argument is that knowledge shared informally among students is a potential knowledge resource for both students and educators. As a student resource, it allows students to reconstruct their own understanding as they share their knowledge with each other. As an educators' resource, it serves as a diagnostic tool about students' knowledge levels hence identifying areas of misunderstanding or misconceptions.

Thus, the study investigates the phenomenon of informal consultations among students. Informal consultations are not confined to particular locations or time, and therefore are difficult to both observe and capture. Mindful of the need to observe informal consultations in an authentic context, I developed an anonymous web-based consultation environment (DFAQ – Dynamic Frequently Asked Questions). The objective of DFAQ was to provide students with an environment through which they informally consulted with peers. Students with questions (information seekers) anonymously posted questions into the DFAQ environment. Any student may respond (as information giver) to a question and there was no limit to the number of responses to a question. While an information seeker receives a response to a question, both the question and response (DFAQ artefacts)

were accessible to other students. The educator used the DFAQ to learn about knowledge that students share with one another.

The focus of this study is on the analysis of the DFAQ artefacts. There are three aspects addressed: the text (questions), interaction and the social context. To this end, Critical Discourse Analysis (CDA) is used as an overarching framework because of its focus on the three dimensions of text, interaction and social action. The aim of this analysis is twofold: a) to understand the relationship between questions and student levels of knowledge, and b) to understand the interplay between informal interaction for knowledge acquisition (human actions) and societal constraints (traces of the mind). For this reason, I have used theories of text (i.e., Hermeneutics, Speech Act Theory, and Semantic Networks) to give effect to CDA's text component. A theory of human interaction (i.e., Communicative Rationality) gives effect to the interaction component and a theory of human action (i.e., Structuration Theory) gives effect to the Social Context component.

This study employs an interpretive paradigm. The study rests firmly on the notion that knowledge is not the outcome of the mind that is detached from everyday concerns but is an outcome of human activity that is motivated by natural needs and interests. It uses a case study approach with particular focus on two cohorts of part-time students registered for an honours course at the University of Cape Town in 2002 and 2003. Though registered at a contact University, the work pressures of these students meant that physical access to fellow students for consultation was impractical. DFAQ was therefore used as a communication space, a social space and an educative space.

There are three types of empirical materials gathered and analysed: the DFAQ artefacts, focus group discussions, and in-depth interviews. Artefacts, in particular questions, are analysed in terms of Speech Acts for two reasons: to uncover what lies behind the questions which students ask one another; and



to understand the type of knowledge underlying questions. DFAQ mediated interaction is analysed in terms of the effect of anonymous communication, text-based communication and access to shared knowledge. Human Action (DFAQ mediated informal interaction) was analysed using structuration theory.

The practical contribution of this research lies in the extension (through DFAQ) of the current limitations of cluster-based informal consultation, creation of a knowledge resource from informal consultations and allowing educators access to knowledge informally shared among students. The theoretical contribution lies in the methodology or approach of analysing the three dimensions of computer mediated interaction: text, interaction and social context. In particular, the integration of Structuration Theory into a CDA framework and the use of various theories to underpin the three dimensions of text, interaction and human action provide an operationalization of CDA and Structuration Theory in Information Systems Research. Perhaps the most significant contribution is that this research contributes to bridging the gulf between IS research and IS practice.

## Chapter 1

## INTRODUCTION

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# 1.1 Introduction

I will start this introduction by unpacking the thesis title, towards a knowledge-sharing framework based on student questions – the case for a dynamic FAQ Environment. To the extent that the title of this thesis is a high-level summary of the work contained in this monograph, I will use the title as a point of departure. I use the word *knowledge* in Habermas’ way, which is not about “the possession of knowledge but rather how speaking and acting subjects acquire and use knowledge” (Habermas, 1984:8). In this thesis, I have used the terms information seeking and giving to refer to the process of “speaking and acting” or “asking and responding” to questions. The terms knowledge de-construction and construction refer to knowledge acquisition and use. Knowledge sharing is therefore a human activity involving information seeking, information giving, knowledge de-construction and knowledge construction.

Figure 1.1 depicts a knowledge sharing activity involving five students. The puzzles in the middle represent exchanged knowledge.

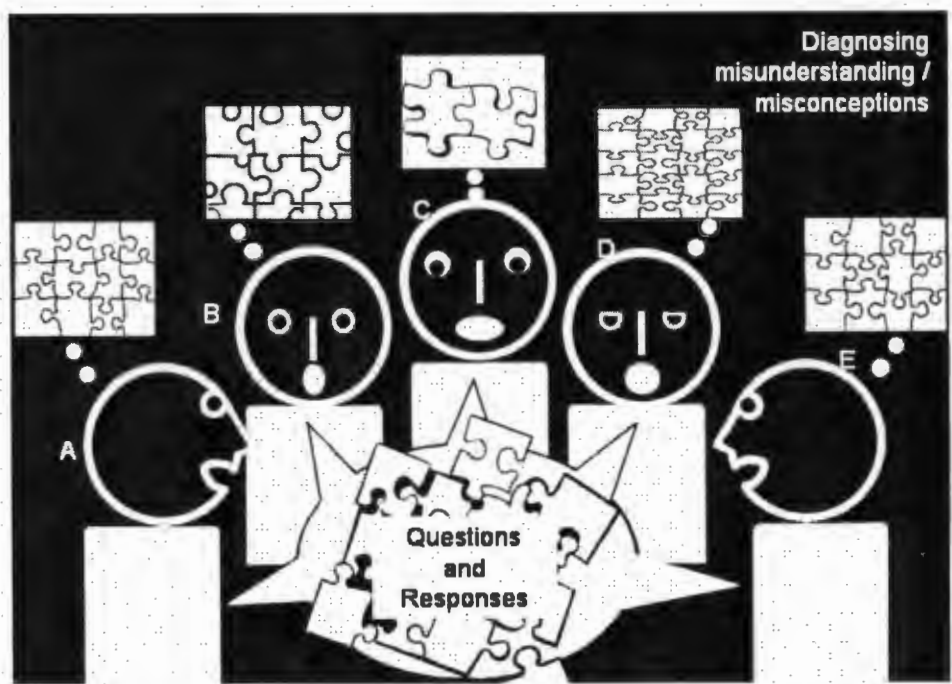


Figure 1.1 Cluster of five-students

The students are seeking information from one another (questions) and giving each other information (responses). The puzzles on top of each head (notice that it is different for everyone) represent acquired knowledge. The acquired knowledge is both an outcome of knowledge sharing and a source of knowledge shared. Bressman *et al.* (1999) argue that knowledge sharing and the process of knowledge transfer require that the receiving party accumulate new knowledge. To accept Bressman's view of knowledge is to view knowledge as a "commodity" which exists independent of every day concerns and can be shared and transferred from person A to person B. Knowledge sharing is a process of construction and de-construction of knowledge through interaction of human agents. Polanyi and Prosch (1975) give an example of how chemistry students construct and deconstruct knowledge in laboratories.

*Students of chemistry, biology, and medicine spend a good half of their time in laboratories and dissection rooms, where they seek to bridge the gap between the printed text of their books and the facts of experience. They are trying their eyes, their ears, and their sense of touch to recognise the things to which their textbooks and theories refer. However, they are not doing so by studying further textbooks. They are acquiring the skills for testing by their own bodily senses the objects of which their textbooks speak (p. 31).*

I infer from Polanyi and Prosch that like conducting experiments, asking questions helps to recognise the things to which textbooks and theories refer. Questioning facilitates the construction and deconstruction of knowledge and hence bridges between printed text and the facts of experience. Polanyi and Prosch (*loc. cit.*) add that "textbooks of chemistry, biology, and medicine are so much empty talk in the absence of personal, tacit knowledge of their subject matter. The excellence of a distinguished medical consultant or surgeon is not due to his more diligent reading of textbooks but to his skills as a diagnostician and healer – a personal skill acquired through practical experience" (p. 31). My argument is that informal knowledge sharing and in particular questioning as an instance of knowledge sharing has the potential of diagnosing and healing student misunderstanding and misconceptions. The use of questions for diagnosing knowledge is pointed out by Mao and Benbasat (2000) who observe, "failure to identify the deficits in knowledge means there is an inadequate cognitive foundation for asking questions, since questions arise from knowledge rather than ignorance" (p. 159).

The conventional thinking among many educators is that asking students questions helps to gauge levels of students' knowledge. Informal knowledge sharing is a human activity and a question is a form of expressing a need for information. My thesis is that questions and not necessarily answers reveal something about what a questioning agent knows or does not know and therefore are useful for diagnosing knowledge levels.

Now that I have explained what the general idea is about, I will proceed to unpack the rest of the thesis title. Although Figure 1.1 illustrates the idea, it does not show the complexity involved and I will briefly indicate some of the challenges posed by this problem:

- Informal consultations are not restricted to particular places or particular times. It is therefore impossible to observe them taking place.
- Informal consultations are erratic and therefore difficult to observe.
- Informal consultations do not leave artefacts or a record of a conversation.

The above problems are elusive in that they resist capture. It is against the backdrop of these challenges that I use the word *towards* in the thesis title to suggest that there cannot be an exhaustive solution to an elusive problem. The next word of significance in the title is *based*. In this research, I am specifically interested in informal knowledge sharing that uses questions, and where students ask one another questions anonymously. I am therefore not using students as surrogates (see Introna and Whitley, 2000 for a critique on using students as surrogates) but students are the object of my research. Although this work has focused on information sharing among students, the framework I have proposed may also apply in non-educational knowledge sharing contexts. This brings me to the word *framework*. I had difficulties in deciding whether to use the word model or framework. In retrospect, I was actually right to have called it a framework because the word model suggests something definitive. In this research, I have taken an interpretive approach, as opposed to an objectivist approach and do not therefore claim that *we can definitely arrive*.

Now that I have demystified the thesis title, I will conceptualize my research problem.

## 1.2 Problem Statement

Empirical evidence shows that students learn from each other (Burbules and Bruce, 2001; Bell and Davis, 1996). Anecdotal evidence suggests that students consult with each other

informally hence learn from one another. Figure 1.1 depicted a cluster of five students informally consulting one another. In Figure 1.2, two students are consulting. It is within these clusters that informal knowledge sharing takes place.

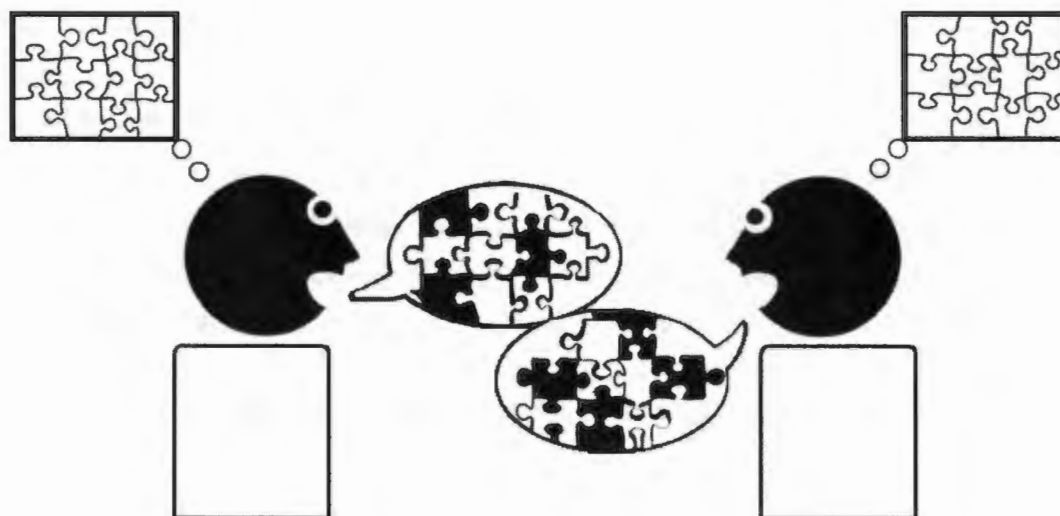


Figure 1.2: Cluster of two students

During a conversation (see Figure 1.2), a student brings to it prior knowledge (illustrated with puzzles) and the black pieces in the middle bubbles shows the use of new ideas acquired from a conversation. At the end of the consultation (when they both shut up) the bubbles disappear leaving no artefacts except the fact that the mental states have changed. A conversation is therefore *never neutral* as it causes some shifts to occur in the mental state. Equally important is that these students draw from the *mental puzzle* during discussion. The focus of my thesis is on using information shared informally as a vehicle to understanding the *mental puzzles* of students. Information sharing is not just constrained by prior knowledge but also by the social cultural context. For example, student consciousness of their individual identities and experiences may influence information sharing with peers. Information sharing is a product of mental structures (imagination, worldviews, etc), social cultural context and produces mental structures that influence social cultural perspectives.

Given this understanding, I will now describe the problems that premise this research:

### **1.2.1 The problem of access to knowledgeable peers**

Informal knowledge sharing among students has tended to be restricted to clusters and not necessarily to knowledgeable peers. Suggested by this is the fact that students do not use knowledge levels of peers as criteria for consultation but decide on who to consult based on whether or not they are members of a cluster. Thus, the first problem is that of student access to knowledgeable peers. I do not use the word *knowledgeable* to mean experts but my definition of the word includes *anyone who asks questions, which cause a hearer to think about what they know and to explain their knowledge to others*. The problem is made complicated by the fact that it is difficult to pre-determine who knowledgeable peers are prior to the questioning.

### **1.2.2 The problem of access to shared knowledge**

The limitation of cluster based knowledge sharing suggest that there is an uneven distribution of knowledge in clusters and that knowledge shared in one cluster is not accessible to other clusters. Thus, the second problem is that knowledge shared informally does not leave artefacts and is therefore difficult to share with others. The challenge is that of allowing members of other clusters access to informal knowledge when such knowledge does not *persist* beyond a consultation session. I use the word *persist* to mean leaving of traces or artefacts of what happened. Unless shared knowledge persists, it is difficult to make it accessible.

### **1.2.3 The problem of access to “mental structures”**

Information sharing is a product of mental structures (depicted as puzzles in Figure 1.1 and 1.2 above) and produces new mental structures. The relationship between information sharing and mental structures suggests that artefacts of information sharing may provide access to mental structures. Thus, the third problem is that of mapping or drawing relationships between information shared and mental structures.

In the next section, I will outline the research questions.

## 1.3 Research Questions

Given that informal consultations are cluster based, there is need to explore ways of widening access to knowledgeable peers through the creation of virtual clusters. Virtual clusters are anonymous communication spaces. The hope is that anonymity would dissolve clusters and extend access to knowledgeable peers. The implementation of anonymity requires an exploitation of asynchronous computer mediated communication (CMC). This leads to questions about the effect of anonymous CMC on informal consultations, knowledge acquisition and learning.

The problem of shared knowledge not leaving artefacts provides a need to explore the potential of text-based communication. Through text-based mediated interaction, in particular CMC, informal consultation could 'persist', thereby extending the severe limitations of clusters. This leads to questions about persistence of informal consultation, access to shared knowledge and the effect of such access on knowledge acquisition.

Information that is shared informally among students is indicative of what students know. Therefore, access to the said information provides a way of understanding student knowledge levels. This argument leads to asking questions about what educators can learn from informal information shared among students.

### Primary research questions

- 1.3.1 How does anonymous computer-mediated interaction influence the question-driven knowledge acquisition among students?
- 1.3.2 Can student-to-student consultation dialogue *persist* beyond a consultation session?
- 1.3.3 In what ways can *persistent* student-to-student dialogue influence learning and teaching?
- 1.3.4 What can educators learn about students from students' questioning patterns?

### Secondary research questions

- 1.3.5 What is the impact of anonymous student-to-student consultation on student questioning and responding to questions?



- 1.3.6 To what extent are students able to express their need for information and to what extent is the need for information satisfied through questions and responses?
- 1.3.7 What is the nature of questioning dialogue that happens during student-to-student consultation?

The rest of the thesis is devoted to answering these questions. I will begin by combing literature to review projects or works that have attempted to resolve the problems discussed in Section 1.2. This review is important for two reasons: a) To acknowledge sources that shaped the thinking of my research, b) To show how this work will contribute to the current body of knowledge.

## 1.4 Related Work

CMC in general, and in particular e-mail, has been investigated (Pilkington *et al.*, 2000; Alexander, 2002; Ngwenyama and Lee, 1997). The advantage of e-mail is that it is text-based and persists beyond a communication session. However, e-mail communication is not anonymous, requires that a sender knows the address of a recipient (see problem 1.2.1), and is only accessible by the targeted recipients (see problem 1.2.2). I will review some of the student e-mail projects and highlight some of the limitations in relation to the problem statement (see Section 1.2).

The use of questions and answers for information seeking and information giving is not new. The Answer Garden (Ackerman, 1990; 1994; 1998), FAQshare (Van and Trentini, 2002), the Questions and Answer (Q&A) natural language question-answering system (Budzik and Hammond, 1998) and MULDER (Kwok *et al.*, 2001) are some of the example projects. These projects did not focus on knowledge sharing among peers, did not create a knowledge resource, and did not attempt to analyse knowledge embodied in questions. I review these projects and highlight the associated limitations with each.

### 1.4.1 Student e-mail projects

As I review student e-mail projects, I will begin by clarifying what I mean by *e-mail*. The word e-mail could mean an electronic message medium or a message sent electronically. For example, there is a difference between, a) *I will use e-mail to contact him*, and b) *I received an*

*e-mail from him*. While a) is referring to a medium of communication, b) is about an artefact of an e-mail communication. As an advance notice, this distinction will become important later when I begin referring to the dynamic frequently asked questions (DFAQ), as both a medium of communication and an artefact simultaneously. I will remind you though, when we get there. However, for now, there are three e-mail projects of interest.

- Pilkington *et al.* (2000) conducted online chat sessions with students using an in-house developed tool, CHAT, based on WebCT tools, to support students with issues arising from reading set papers. CHAT does not attempt to create a knowledge resource from *issues arising from reading set papers*.
- In her recent thesis, Alexander (2002) investigated discussions between students (via e-mail or face-to-face) with particular focus on how student discussions contribute to sharing meanings and the nature of obstacles these meanings create. Alexander analysed student e-mail (*e-mail as an artefact*) and WebCT messages. The artefacts did not result in a knowledge resource and neither did the researcher analyse e-mail to access the *minds* of the e-mail users.
- Ngwenyama and Lee (1997) focused on e-mail communication (*e-mail as a medium*) between managers. However, communication was neither informal nor did it lead to a shared knowledge resource. Although this project did not involve students, it illustrates how artefacts of e-mail messages are a product of e-mail communication.

Although these projects did not focus on creating a resource from the artefacts of communication, they reveal the fact that electronic communication leaves *traces* behind which provide leads to the problem of knowledge *persistence* (see Problem 1.2.2). Problem 1.2.3 depends on resolving Problem 1.2.2.

### **1.4.2 Question / Answer based projects**

In this section, I will briefly review four projects. I have chosen these projects for their attempt, however unwittingly, to address some of the problems I have identified in Section 1.2 above.

- i) Answer Garden (Ackerman, 1990; 1994; 1998) is a system that allows users to find commonly asked questions by navigating branches of a tree of possible answers. If an answer is not available, the system sends the question to a human expert who responds to a user via e-mail. The expert decides on which questions to add to the Answer Garden database (Ackerman and McDonald, 1996).
- ii) In Van and Trentini's (2002) FAQshare, when students ask questions they wait for a vote in a queue. Students vote for the questions in the queue. The teacher selects questions from the list with the most votes and answers them. The teacher also decides whether to insert the answered questions in the FAQ list for the benefit of all students. FAQshare suffers from rejecting questions perceived as not popular and limiting the inclusion of questions to the FAQ list to a teachers' discretion.
- iii) Questions and Answer (Q&A) natural language question-answering system (Budzik and Hammond, 1998) captures and organizes memory. The Q&A works by mediating the interaction between an expert and a question-asking user. When a question is new, Q&A refers the question to an expert user to answer but retrieves previously answered questions. When an expert answers a question, the resulting question-answer pair is stored in the Q&A system for later use.
- iv) MULDER (Kwok *et al.*, 2001) is an information carrier in which the user asks questions in natural language, from which it constructs a tree of the question's phrasal structure. It uses the tree to translate the question into a series of Google search engine queries. MULDER does not create a knowledge resource from questions asked and Google search results.

A common thread in all the above projects is the use of questions for information seeking. This suggests that a question is an expression of a need for information and FAQ lists represent frequently expressed needs for information. These projects give hope that questions can be used as expressions of intentionality (see Problem 1.2.3) and that FAQ

lists have the potential of becoming a space of accessing knowledge (see Problem 1.2.1) embodied in expressed needs. For these reasons, I will review the FAQ phenomenon.

## 1.5 Literature Review

### 1.5.1 The FAQ phenomenon

To the extent that I am concerned with questions that students ask, and the creation of a question driven knowledge resource, the phenomenon of Frequently Asked Questions (FAQ) appears to be a promising model to build on. The primary purpose of FAQ lists is “to share chunks of information most likely to be required using a question and answer format” (Ng’ambi, 2002c). The term FAQ suggests a list containing questions that are frequently asked, but this is not often the case as Ng’ambi observes, “Although the use of FAQs is widely used, there is no evidence that most FAQs contain frequently asked questions” (Ng’ambi, 2002d). The current model of FAQ lists in which a FAQ writer compiles a list of questions that are frequently asked is laborious as Shaw (1996) observes,

*The last few years have seen an explosion of FAQs, both in printed form and online. There are tens of thousands of them, and hundreds more are written and posted each week. Behind every FAQ is a FAQ writer, and probably a FAQ ‘maintainer’ as well. Sometimes these are the same. At some companies, the FAQ writer has moved on, leaving the ‘maintainer’ to tend herd over the flock of questions, weeding out ones that become obsolete, migrating new ones to the FAQ list, cleaving up the FAQ list into several lists when the list itself becomes overly long and complicated (p. 3).*

The explosion of the phenomenon of FAQ lists suggests two possible things: there is an increased demand for information that is question driven, or there is an increase in willingness to respond to questions. The compilation of FAQ list from frequently asked questions “is an implicit anticipation that the questions will be referenced (read / used)” (Ng’ambi, 2002c). The objective of FAQ lists is to make available information based on previous questions and hope that the FAQ list pre-empts future questions.

### 1.5.1.1 FAQ pre-emptive approach

The underlying assumption of FAQ lists is that frequency patterns of questions are indicators of information needs. Information needs are dynamic and so are the frequency patterns of questions. There are two reasons for compiling FAQ lists: i) to share information using a question and answer format, ii) to pre-empt future questions through an advance response. The FAQ pre-emptive approach argues that *the majority of questions (80%) are based on a few key causes (20%). By responding to 20% of key causes 80% of questions can be answered* (Ng'ambi, 2002c). Thus, given an increase in the frequency of questions, it would seem that the FAQ writers focus on responding to 20% of causes. However, given that information needs are not static, the compilation of FAQ list ought to correspond with the changing information need. FAQ lists use frequently asked questions to pre-empt future questions. My approach is to use FAQ lists to understand the *reasoning behind questions* and hence use questions to understand information needs, which otherwise are not explicitly expressed in questions.

### 1.5.1.2 FAQ pre-packaged solution

The use of FAQ lists for learning assumes that an information seeking process involves seeking responses to questions with little attention paid to information need and information use. Loeber and Cristea (2003) postulate an information seeking process as involving three steps; *information needs, information seeking and information use* (p. 46). Loeber and Cristea provide a way of thinking of information seeking as driven by information needs, and postulate that the goal for seeking information is to use the information to satisfy the perceived needs. The next weakness is the assumption of FAQ lists that information needs can be met using pre-packaged solutions.

### 1.5.1.3 FAQ is flawed theory of knowledge construction

Accepting the argument of Loeber and Cristea (*op. cit.*), I argue that information need is a mental activity expressed in an information seeking action. The use of information is a mental activity in that if the need is to know something, information use happens when knowing takes place. It follows that while information seeking is a surface structure

(external activity hence observable), information need and use are deep structures (internal activities manifested in surface structures). Walsham (2002) suggests that mental structures and human actions are related, "Structure '*in the mind*' and its links to action can be analyzed through the dimensions of meaning, power, and norms" (p. 366). Walsham provides a way of thinking that human interaction may be constrained by the interpretation that interacting agents attach to the world under experience. Wang and Ariguzo (2004) suggest "...Individuals construct their own knowledge through experiencing and interacting with the surrounding world" (p. 446). I infer from Wang and Ariguzo that human actors do not create knowledge by reading responses to FAQ lists, but rather when they actively engage with the questions and responses. I use the term *active engagement* to mean the treatment of questions as being open to further questions and responses as being open to further enquiry. To this end, I argue that conventional FAQ lists are a flawed theory of knowledge construction as there cannot be construction of knowledge without active engagement. In other words, rather than present static FAQ lists, knowledge construction will require interactive engagement with FAQ lists; readers need to question the information they receive.

#### 1.5.1.4 FAQ assumes information usage

In Section 1.5.1.1, I discussed the pre-emptive objective of FAQ lists. The underlying assumption of a pre-emptive goal is that FAQ lists are used. The writer of FAQ lists is usually absent from the act of reading, and there is no feedback from reader to writer. I have argued, "...there is no evidence that FAQ lists are used" (Ng'ambi, 2002d). My argument is that questions lose meaning over time and new questions arise all the time (Ng'ambi, 2002a). To the extent that knowledge is an outcome of human action, it is difficult to pre-determine what questions would arise during action. Questions are inputs to human actions as Wang and Ariguzo (2004) argue

*...Given the capability of current IT, any item stored in a computer could be classified as data, or information, or knowledge representation, but should not be defined as knowledge. Generally speaking, expert opinions, data mining results, and decision-making algorithms are high-level information or knowledge representations but they do not constitute knowledge. These pieces of information are inputs to human actions. Knowledge is a result of human actions. In this sense, humans, not computers, possess knowledge (p. 446).*

This recasting of knowledge is consistent with the three-step information seeking process of Loeber and Cristea: a) information need, b) information seeking and c) information use. I note the use of the word *information* as opposed to *knowledge*. I conceptualize *information need* as a need for input into some anticipated *human action*, where action can involve doing or being.

## 1.6 DFAQ proposition

In my discussion of FAQ lists there are two issues I will focus on. Firstly, I will highlight the potential of using FAQ lists in the context of this work. Secondly, I will briefly discuss why an FAQ approach introduces additional complexities to an already complex problem.

The review of Question / Answer projects (see Section 1.4.2) identifies three agents in each project: a question-asking agent, a medium and an expert agent who responds to questions. The focus of most of these projects has been to reduce the number of questions that reaches the expert. In a typical FAQ system, as Van and Trentini (2002) observes, the following people are involved: Users who post questions and access the FAQ list searching answers; FAQ list administrators who processes the questions posted by users and organize the FAQ list; and a group of experts to answer questions. Van and Trentini add that while a FAQ system is an easy tool for users who inquire its content, the FAQ information management is a more complex task (p. 557). Thus, the potential of the FAQ approach lies in its being intuitive and hence easy to use. This is particularly important in the context of informal knowledge sharing among students, as a complex system would discourage such usage.

The complexity of the FAQ approach lies in the management of information, as Van and Trentini have rightly pointed out FAQ lists requiring a *complex information management*. To adopt such an approach in a teaching context would introduce additional complexities in terms of finding administrators to process the questions and organise the FAQ list, and finding groups of experts to answer questions. In responding to these FAQ problems, I have developed a tool, called Dynamic FAQ (DFAQ), which does not require an administrator to process or organise questions, does not require a group of experts to respond to questions but draws from the same users who ask questions to respond to other questions.

I will now show how this research has used the DFAQ as both an informal consultation medium as well as a dynamically created knowledge resource.

## 1.7 Research Overview

Figure 1.3 depicts an overview of my research. I have shown the real world problems in the context of this thesis, my conceptual solution with lenses through which I view the real world problem, and the role of the DFAQ as a research instrument to capture real world data and as an artefact of informal communication.

There are three implementation phases of the research framework. In the first phase the DFAQ is introduced and used in the real world, in the second phase DFAQ artefacts are analysed and experience of participants is sought, in the final phase DFAQ is re-designed on account of the results of the second phase. I will now briefly review these phases.

### 1.7.1 PHASE 1:

In view of the complexities and difficulties of observing and capturing data (see Section 1.1), DFAQ was introduced in the *real world*. The idea here was similar to sending an object to the moon for two years in order to gather and collect data because it is impractical for a researcher to camp on the moon for that purpose. In this context, DFAQ was used (notice a 2-way arrow from DFAQ to the Real World in Figure 1.3) because of the illusive nature of the problem, which resisted both observation and capture. I discuss details of the usage of the DFAQ and empirical materials in Chapter 4.

### 1.7.2 PHASE 2:

Whereas in Phase 1, questions between senders and receivers, information seekers and information givers happen through the DFAQ, interpretations and analysis of artefacts do not happen until Phase 2. In this phase, the focus is on DFAQ artefacts and the experience of students with respect to DFAQ mediated informal consultation. These empirical materials are analysed using multiple methods underpinned by theories (see Figure 1.3). The outcome of this phase is a knowledge-sharing framework. The implementation of the framework is the focus of Phase 3.



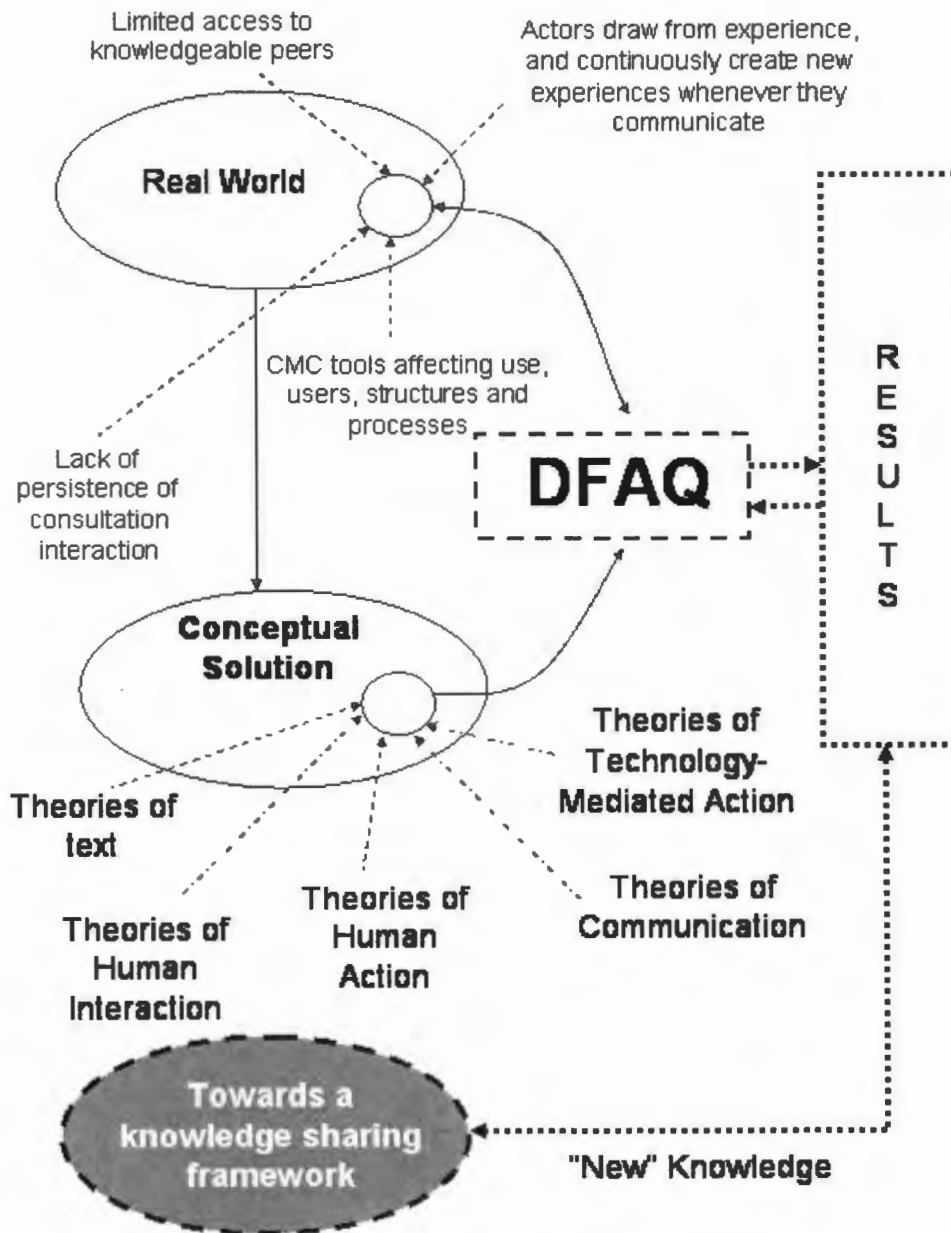


Figure 1.3: Research Overview

### 1.7.3 PHASE 3:

In this phase, DFAQ is re-designed using the framework from Phase 2. The knowledge-sharing framework, based on empirical evidence, informs the re-engineering of DFAQ. The purpose of this phase is to attempt the automation of artefact analysis for knowledge

extraction. For example, Ng'ambi (2002c) provides a data mining technique to predict and pre-empt user questions. The approach has been demonstrated, albeit manually. Thus, the objective of this phase will be to implement techniques that would assist in understanding patterns in questions. Thus, the focus of Phase 3 is two fold: a) to develop an artefact analyser for DFAQ; b) to re-evaluate DFAQ context (I will discuss the current context in Chapter 4) including context evaluation, planning evaluation, setting evaluation and controlling communicative events evaluation.

In this thesis, I will focus on Phase 2. To the extent that Phase 2 is dependent on Phase 1, I will discuss Phase 1 in Chapter 4. Phase 3 is outside the scope of this thesis and I will not discuss it.

In view of this, my research is recursive as it observes a problem (informal knowledge sharing), develops a solution (DFAQ), investigates the social-technical context of DFAQ and improves the development and deployment of DFAQ.

## **1.8 How the thesis is organised**

In Chapter 2, I review the theories underpinning this research. In Chapter 3, I discuss the research approach. In Chapter 4, I discuss how empirical materials were gathered. In Chapter 5, I analyse empirical materials and discuss the results. In Chapter 6, I review the problem statement and research questions. In Chapter 7, I evaluate the research process, discuss the contributions of this research and conclude.

## Chapter 2

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## 2.1 Introduction

Recent literature in information systems and knowledge management has recast FAQ lists as Knowledge bases (Warner *et al.*, 2001; Ng'ambi, 2002c; 2002d), digital genres (Antunes and Costa, 2003) and organizational memory (Ackerman, 1990; 1994; 1998). To the extent that FAQ lists consist of frequently asked questions, they are a repository of tacit knowledge. Grover and Davenport (2001) observe, "...tacit knowledge is knowledge embedded in the human brain and cannot be expressed easily, and explicit knowledge is easily codified" (p. 7).

When a person asks a question, she is drawing from her tacit knowledge and to acquire new knowledge is to add to the tacit knowledge. In this regard, informal knowledge sharing is sharing of tacit knowledge. To take this view is to accept that,

*We cannot ultimately specify the grounds upon which we hold that our knowledge is true. Being committed to such grounds, dwelling in them, we are projecting ourselves to what we believe to be true from or through these grounds. We cannot therefore see what they are. We cannot look at them since we are looking with them. They are indeterminate (Polanyi and Prosch, 1975:61).*

I infer from Polanyi and Prosch that tacit knowledge constrains human interaction. To the extent that informal knowledge sharing involves interpretation of questions and responses, it is a product of tacit knowledge and produces tacit knowledge. I argue that patterns in questions provide a way of diagnosing the tacit knowledge level of students. The challenge is that tacit knowledge is elusive as Stenmark (2001) points out,

*Tacit knowledge is elusive, due to at least three reasons: we ourselves are not fully aware of it; there is no personal need to make it explicit on the individual level; and there is a potential risk of losing power and competitive advantage by making it explicit (p. 11).*

In this chapter, I discuss the different theoretical approaches that underpin this research. There is a difference between a theory and theoretical approaches as Jansen and Steinberg (1991) elaborate,

*Authors frequently confuse theory (a body of theoretical approaches) with a theory. Since the same view of communication may be expressed in different ways, any theoretical approach generates a number of individual theories, each of which represents a particular version of the same view (p. 4).*

I am not discussing a theory but theoretical approaches, each of which has different theories.

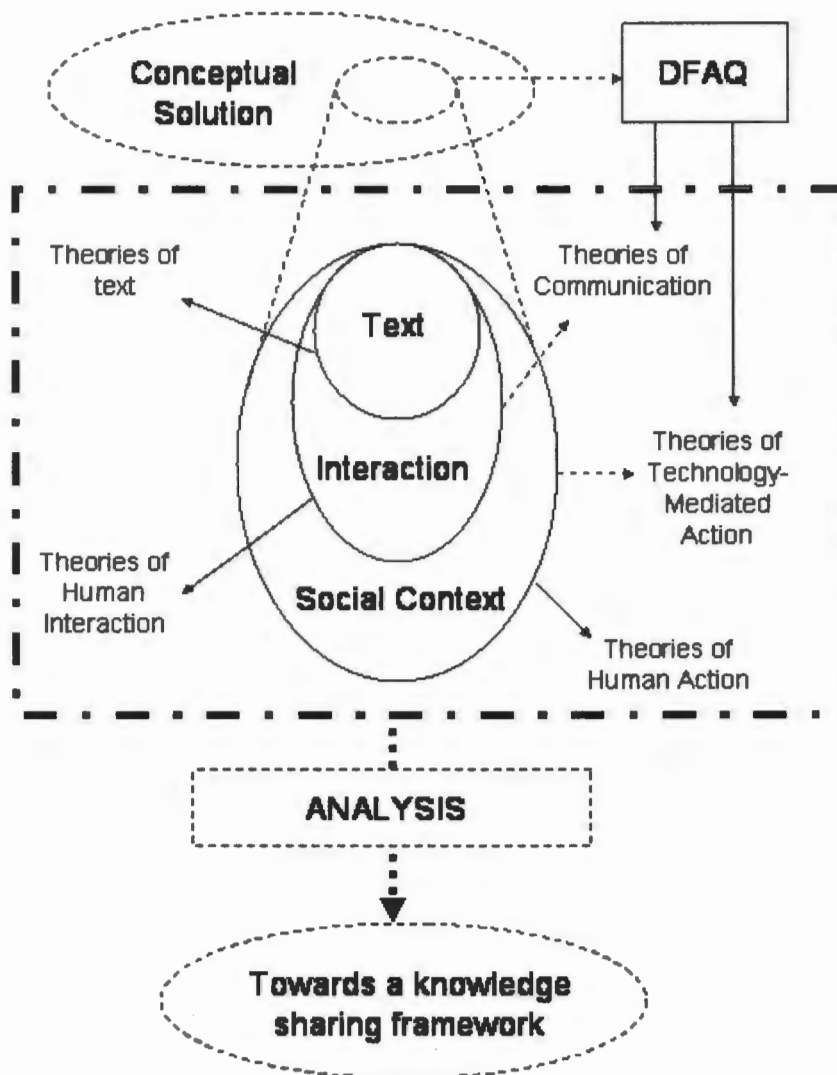


Figure 2.1 Overview of underpinning theories

In Figure 1.3 (see Chapter 1), I showed my conceptual solution underpinned by various theories. In this chapter, I discuss these theories in detail. In the context of this research, there are three objects of interest: text, interaction and social context. Text is an outcome of human interaction mediated by the DFAQ. Human actors are part of a social context.

Figure 2.1 depicts the various theories that underpin the different facets of this research, namely: theories of text, theories of technology mediation, theories of communication, theories of human interaction and theories of human action. I will now review these theories.

## **2.2 Theories of Technology-Mediated Action**

### **2.2.1 Zone of Proximal Development (ZPD)**

Vygotsky conceptualises the Zone of Proximal Development (ZPD) as the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers (Vygotsky, 1978: 90).

It is within the ZPD that mediation effects change; it is here that teachers /tutors/ more experienced peers can exert some influence on the learner's future. Educational interventions deployed within a ZPD provide opportunities for learning. This understanding of mediation informs my specific focus on questioning in this research. Questions are indicators of the gap between what the learner knows and what the learner needs to know. It follows that questions provide access to the learner's ZPD. Questioning is therefore a very useful indicator of what assistance the learner needs. As such, it is a useful learning-teaching tool for the teacher. The learner's question, then, is not only a useful pedagogical indicator of the learner's knowledge base; it is also a cognitive tool, capable of regulating mental actions.

## 2.2.2 Technology-Mediated Action

I use the term technology-mediated action to mean two things: technology as a medium and technology as a tool. To have a media view of technology-mediation is to see technology as being for reaching information or for entering into communication process (Rasmussen, 1996:98). To have a tools view is to see it as Rasmussen (*ibid.*) put it, *tools of action in everyday life* (p. 98). In the context on this research, the media view of the DFAQ allows information seekers to communicate with information givers. A tool's view is that information seeking is a part of human activity and DFAQ is used whenever a need arises for which consultation is required.

I contend that media shapes communication, and tools shape activities. To the extent that DFAQ is a tool and a medium, my assumption is that DFAQ influences consultation in terms of discourse practices and communication activities respectively. The use of electronic media introduces new forms of discourse as Scollon and Scollon (1995) observe, "...the new electronic media is a form of discourse" (pp. 215, 218) and in particular "the computer as a medium has in many ways come to be the driving metaphor of such objective competence." (p. 220). Technology is a tool of action that students can use technology to learn, and teachers to teach. Technology as a medium gives an understanding that students can access other students for consultations without suffering from the limitations of time and space.

Although technology is a powerful medium of communication, the medium requires that a human agent use it intentionally. Rasmussen (1996) observes,

*As 'tools' communication technologies participate in intentional undertakings. In this, some tacit/practical and reflexive attention is directed toward some other human or material object – such as a hammer or a computer terminal (p. 99).*

Informal knowledge sharing is an intentional undertaking in that a question is an expression of intention. The purpose of an intentional understanding is to direct attention to some human or material object. The use of DFAQ is an intentional undertaking in that an information seeker directs attention to information givers, or information givers respond to requests from information seekers.

At this point, I will go back to the problem discussed in Chapter 1 (see Section 1.2.1). The nature of access referred to is that of attention, more accurately being able to direct intention for information to knowledgeable peers.

Now that I have described the concept of technology-mediated action, I will draw attention to two categories of theories: communication theories and human action theories. I will begin with an overview of Computer Mediated Communication and then proceed to discuss the theories of communication.

## 2.3 Computer-Mediated-Communication (CMC)

In the 21<sup>st</sup> century, CMC has become pervasive (Castells, 1996; Kahai and Cooper, 1999). Castells (1996) observes that

*...as CMC becomes pervasive in the university system on an international scale during the 1990s, the graduates that will take over companies and institutions in the early twenty-first century will bring with them the message of the new medium into the mainstream of society (p. 356).*

Kahai and Cooper (1999:166) argue that globalization, telecommuting and access to facilities that enable CMC such as the Internet have led to increasing use of CMC. Nevertheless, there has not been much attention paid to the use of CMC for informal knowledge sharing. Castells attributes the lack of research in CMC to the newness of the field and concludes that “computer mediated communication is too recent and has been too narrowly experienced [as at 1995] to have been the object of rigorous, reliable research” (p. 358). Thus, this thesis is a contribution in an area where not much work exists and like any pioneering work, it has not been without challenges.



## 2.4 Theories of Communication

### 2.4.1 'Bizarre' Theory of Information

I will review this theory of information for two reasons; a) it is one of the foundation theories in information systems; b) despite it being *bizarre* and useless it is still in use.

As a prelude to the theory, I distinguish two types of communication; *interaction* in which a source transmits a message to a receiver, who upon receiving and decoding the message, gives feedback to the original source (Pepper, 1995:8); and *transaction* in which messages carry meanings to be interpreted (Stohl, 1995:48; Pepper, 1995:9). Most CMC such as email, discussion forums, chat rooms, bulletin boards and many others are forms of information systems premised on a disappointing and bizarre theory of information. Checkland (1992:354) cites Weaver who in 1948 wrote that:

*The concept of information developed in [Shannon's] theory at first seems disappointing and bizarre – disappointing because it has nothing to do with meaning and bizarre because it deals not with a single message but rather with the statistical nature of a whole ensemble of messages...*

Checkland adds, "...what is disappointing and bizarre about the theory is that to the communications engineer there is not a fundamental difference between I have just changed my socks' and I have just pressed the nuclear button!" (p. 354). Obviously, the theory is bizarre because of its premise on *interaction communication* and because it pays no attention to the *transaction communication*. The focus of the theory of information is on messages from the sender reaching the intended receiver and is oblivious of the meanings that both a sender and receiver attach to the message. The fundamental nature of information systems is to share meanings without which information systems are useless. Lyytinen and Klein (1985) observe, that information systems would be useless if they could not assist the sharing of meaning and knowledge, and users of information systems do understand, at least partially, the meaning of messages that they put into and receive from the system (p. 226)

To the extent that it would seem bizarre to pursue a disappointing and bizarre theory, I am less concerned with the *interaction* aspect of communication and more with the *transaction*. My thesis is that transaction communication depends on interaction communication and the former cannot happen without the latter. I am, in this research, interested in knowledge as an *outcome of technology mediated transactions*. My use of CMC is indicative of my using interaction type of communication, which is useful for addressing Problem 1.2.1 (see Chapter 1).

### 2.4.2 Theory of Communicative Action

Lawley (1992) observes that the work of Habermas and his contemporaries, can be used to better understand the medium of Computer Mediated Communication and the patterns of interaction that have been observed in that medium. Lawley's argument has been supported by IS researchers (Ngwenyama and Lee, 1997; Hirschheim, 1985; Cecez-Kecmanovic and Webb, 2000). In this section, I will discuss the theory of Communicative Action.

Habermas (1987:126) argues that the concept of communicative action involves two aspects: the teleological aspect of realizing one's aims (or carrying out one's plan of action) and the communicative aspect of interpreting and arriving at some agreement. In communicative action, participants pursue their plans cooperatively based on a shared definition of the situation. If there is first a negotiation of a shared definition of the situation, or if efforts to come to some agreement within the framework of shared situation definitions fail, the attainment of consensus, which is normally a condition for pursuing goals, can itself become an end. In any case, the success achieved by teleological action and the consensus brought about by acts of reaching understanding are the criteria for whether a situation has been dealt with successfully or not.

According to Habermas (1991), Communicative Action is a circular process of initiating and becoming a product of initiated actions. Communicative Action is a circular process in which the actor is two things in one: an initiator, who masters situations through actions for which he is accountable, and a product of the transitions surrounding her, of groups whose cohesion based on solidarity to which he belongs, and of processes of socialization in which he is reared (p. 135). I see this theory as being particularly relevant in understanding informal knowledge sharing within clusters.

To view knowledge sharing using a Communicative Action theory lens is to accept that the information students share informally is *ex nihilo nihil fit* but is a product of tacit knowledge. Students do not therefore speak *de novo* but speak what they already know and relate what they speak to a familiar world around them. Accepting this argument is to accept that we can deduce what students know from what they speak, and that what they speak is a representation of what they know. It means artefacts of what students share is a knowledge resource as it represents what students know. To the extent that students speak from what they already know, they can only understand what they hear in relation to what they already know. Habermas (1984) points out that, every process of reaching understanding takes place against the background of a culturally ingrained pre-understanding (p. 100). The term *reaching understanding* means, at least two speaking and acting subjects understand a linguistic expression in the same way (p. 307). It follows that the speaking and acting subjects would reach understanding if they have a shared pre-understanding. This gives hope that when students consult with one another they are more likely to reach understanding because they have a shared pre-understanding. Culturally ingrained pre-understanding helps in reaching understanding, and at the same time, pre-understanding constrains interaction and information sharing.

In view of this, my first assumption is that information shared informally provides a window to students pre-understanding. Habermas (*loc. cit.*) suggests that students are a product of information they receive, communities to which they belong and processes of interaction with the society in which they live. The circular process view postulates that students are not only products, but also produce information, which impacts on communities and processes of interaction of which they are products. My second assumption is that information shared may provide insight into community practices and barriers to information sharing. In order to achieve this understanding, it seems reasonable to analyse the speech acts of shared information. I will discuss Speech Act Theory in Section 2.6.2, but to the extent that speech acts are fundamental to Communicative Action Theory, I will briefly preview speech acts from Habermas' perspective here.

According to Habermas (1991): *speech acts can link the action plans of one actor with those of the other actors via rationally motivating achievements in reaching understanding – rather than by exerting influence, i.e. empirical intervention* (p. 233). This view is significant in that it gives a way of thinking that, although there could be a difference in the way language is used at the

expressive level, the speech acts may reveal the rational motivation of what is said and to what it is related. Habermas (1991) asserts that the action-coordinating role of processes of reaching understanding in Communicative Action theory (p. 233) uses pragmatic classification of speech acts (Habermas, 1984:321).

### 2.4.2.1 Interpreting Communicated Messages

According to the theory of meaning (Habermas, 1984),

*...the meaning of sentences, and the understanding of sentence meanings, cannot be separated from the language's inherent relation to the validity of statements. Speakers and hearers understand the meaning of a sentence when they know under what conditions it is true. Correspondingly, they understand the meaning of a word when they know what contribution it makes to the capacity for truth of a sentence formed with its help (p. 276).*

Habermas (*loc. cit.*) suggests that speakers and hearers ought to have some pre-understanding of the truth condition of a sentence, without whose understanding it is impossible to understand the meaning of a sentence. The question is meaningless unless one understands the condition under which the question is true. Therefore, a question means different things depending on its truth condition.

Rasmussen (1996) argues that rules (values and norms as expressed mentally and in culture) suggest (as do the materiality and authority of resources) the rationality of such practices and constitutes the bond between the techno-scientific and the social world (p. 99). The bond between the techno-scientific and the social world suggests that worldviews affect interpretation and meanings of messages whether the media is techno-scientific or not.

People's worldview shapes their interpretation of messages. According to Heidegger's theory of message interpretation, when the worldview is projected on what is to be understood it creates possibilities.

*The theory of message interpretation suggest that the projecting of the understanding has its own possibility – that of developing itself [sichauszubilden]. The development of the understanding appropriates understandingly that which is understood by it. In interpretation, understanding does not become something different. It becomes itself. Such interpretation grounded existentially in*

*understanding; the latter does not arise from the former. Nor is interpretation the acquiring of information about what is understood; it is rather the working-out of possibilities projected in understanding* ((Heidegger, 1962:88).

The argument put forward here is that it is impossible to understand without interpretation. Heidegger goes further to distinguish between interpretation and acquisition of information. It is not necessary that informal knowledge sharing leads to the acquisition of knowledge but to *workout possibilities* projected in how peers understand the subject. The process of working out possibilities leads to new understanding.

I also see the potential of a collective interactive process of generating and interpreting messages (Stohl, 1995:48) as being able to provide a way of accessing the minds of human agents.

#### 2.4.2.2 Language of Communication

Communication begins with a speaker of a message expressing the intention to engage a hearer in a *form of dialogue*. Dialogue involves *interaction* and *transaction* communication. Transaction communication premised on the fact that messages carry meanings, which the hearer interprets. This interpretation is impossible without the speaker and hearer *sharing a common language*. My use of the terms *sharing a common language* implies more than mere usage of language such as English, but also encompasses understanding the discourse.

*A discourse can be seen as a group of statements that provide a particular language for talking about and acting on a particular object. When statements about an object or topic are made within certain discourse, that discourse makes it possible to construct that object in a certain way. It also limits the other ways in which the object can be constructed* (Du Gay, 1997: 298).

It follows from Du Gay's definition of discourse that students may develop their own discourse when consulting with peers about academic work, which could be different from the discourse used when consulting with teaching staff. An example of how discourse may make it possible to construct the object in a certain way is now given. A speaker may ask *May I have camelia sinensis, please?* Although this question is in English, its meaning may not be apparent to people outside the discourse. The hearer upon failing to interpret the sentence may not respond. [BTW, *camelia sinensis* is tea with caffeine].

Two issues arise from the discussion so far: both the sender and the receiver ought to have shared language and discourse. Lyytinen and Klein (1985:221) observe that in Communicative Action people reach understanding through having a common background of assumptions about the world. In order to understand Lyytinen and Klein's argument it is important to remember that human actors are products of transitions surrounding them. Transitions suggest that the language that students use when sharing information with one another may use discourse common to them at a societal level. This discourse may be different from the academic discourse. Habermas (1984) argues that it is not only at the level of society that ideas and interests combine, we can observe interplay of ideas and interests at the level of culture as well (p. 194). My argument is that if ideas combine at societal and cultural level, then we can use discourse that students use in sharing information, to gain insight into the interplay of ideas and interest between student thinking and the society / culture of students.

## 2.5 Theories of Human Interaction

In this section, I will discuss two theories of human interaction, Discourse Analysis and Communicative Action from the human interaction perspective. Although Discourse Analysis is not new to Information Systems, the potential of discourse analysis to make a real IS contribution is yet to be exploited (Panteli, 2003). Panteli does not elaborate on what she means by *real IS contribution* but I assume that she is referring to using Discourse Analysis as an IS research method.

### 2.5.1 Discourse Analysis

Panteli (*ibid.*) distinguishes between constructivist discourse analysis and critical discourse analysis (CDA). According to Panteli, in constructivist discourse analysis, discursive patterns in language are regularities in text through which phenomena are constructed, reconstructed and ignored. Whereas, Critical Discourse Analysis (CDA) takes a focus on discursive activity in constructing and sustaining traditional power relations. I argue that constructing and sustaining traditional power relations is one way of using discourse analysis. Other ways of using discourse analysis include, as a guide to reform (Willig, 1999), social critique (Willig, 1999; Thompson, 2002), and empowerment (Willig, 1999; Panteli, 2003). CDA is not limited to power relations as Fairclough and Wodak (1997) argue:

CDA analyses real and often extended instances of social interaction that take a linguistic form, or a partial linguistic form. The critical approach is distinctive in its view of a) the relationship between language and society, and b) the relationship between analysis and practices analysed (p. 258). To have a distinctive view of CDA is to view the regularities in text are discursive patterns. To the extent that, critical discourse analysis is very much about making connections between social and cultural structures and processes on the one hand, and properties of text on the other (Fairclough and Wodak, 1997:277), CDA is used rather than social constructivist discourse analysis, and is discussed in more detail in Section 2.5.2.

I am in particular using Discourse Analysis as a guide to reform, as Willig (1999) put it:

*Discourse Analysis, as a guide to reform is praxis-oriented in that it seeks to use the results of discourse analytic studies in order to develop social interventions. Discourse analysis as a guide to reform is committed to radical social change but it does not limit its recommendations to action from below. Instead, discourse analysts who adopt this approach also formulate proposals for improving practice within existing institutions, such as schools, hospitals and the courts (p. 15).*

The practice I seek to improve is that of informal student consultation, viz., access to knowledgeable peers, access to shared knowledge, and access to the mental structures of knowledgeable agents, which currently suffers from severe limitations.

Another approach to discourse analysis is concerned with social critique. This approach seeks to “expose the ways in which language conspires to legitimate and perpetuate unequal power relations” (Willig, 1999:10). An example of this is Thompson (2002) who used discourse analysis on a speech by the President of the World Bank Group. From his analysis Thompson (2002) concludes that,

*the appropriation and discursive deployment of Information Communication Technology (ICT), with its association with progress and rationality, offers a powerful opportunity to further the interests of technocratic, often mainstream stakeholders, acting as a magnifier for dominant discursive interests by creating new subjects for objectification (p. 370).*

Clearly, this approach differs dramatically from using Discourse Analysis as guide to reform. Yet, another discourse analysis category is empowerment that is concerned with the identification of counter-discourses. Willig (1999) observes that empowerment of the promotion of subversive discourse practices and spaces of resistance (p. 12). Panteli (2003) studied discursive patterns of presence and concludes that the use of discourse analysis in this study reveals that instead of an imposed presence determined by Alpha, presence was fluid, negotiated, renegotiated and discursively constructed even in silenced words and emails. I infer from Panteli (*loc. cit.*) that discourse analysis served to empower participants through allowing what were silenced words and emails to be brought to surface.

It follows that there are different approaches to discourse analysis. Ainsworth (2001) observes that “while approaches to discourse analysis differ widely, they share some common characteristics: the use of naturally occurring, unedited text or talk as data, attention to the significance and structuring effects of language, a focus on the local and global context of discourse and focus on discourse as a social practice”. In the context of this study, student questions were authentic and hence naturally occurring, were unedited, paid attention to significance and structuring effects of language, focused on the local (individual) and global (community of students) context of discourse and on social practice.

### **2.5.2 Critical Discourse Analysis (CDA)**

Human interaction involved in informal knowledge sharing is a discourse system. I will begin with a discussion on the characteristics of a discourse system and recast CDA as a useful method of understanding and analysing information systems that facilitate human interaction.

To start with, I will ask the following questions: what characterises discourse systems, and what would we be looking for in analysing such systems? Scollon and Scollon (1995:98) answer both these questions in their outline of four characteristics that define a discourse system:

1. Members will hold a common ideological position and recognize a set of extra-discourse features that define them as a group (*ideology*).
2. Accomplishment of socialization is primarily through preferred forms of discourse (*socialization*).



3. A set of preferred forms of discourse serves as banners or symbols of membership and identity (*forms of discourse*).
4. Relationships prescribed for face-to-face discourse are among members or between members and outsiders (*face systems*).

The three dimensions of CDA, text, interaction and social action, inform my discussion of CDA under theories of human interaction. Fairclough (1992:10) contends that every discourse instance has three dimensions: it is a spoken or written language *text*; it is an *interaction* between people, involving processes of producing and interpreting the text; it is part of a piece of *social action* – and in some cases virtually the whole of it. Fairclough's conception of a discourse instance suggests that technology-mediated informal knowledge sharing is a discourse instance; a Computer Mediated Communication (CMC) is another discourse instance. CDA is particularly significant in this work because of its isolation of text, interaction and social action. To this end, I will briefly discuss the three dimensions of CDA here and come back to them later.

### 2.5.2.1 Three Dimensions of CDA

According to Fairclough, text is an outcome of human interaction. The *modus operandi* of human interaction is that the social conditions that govern both the production and interpretation of text are oblivious to the interacting human agents.

In the context of this research, the outcome of computer mediated informal interaction is text. The informal interaction is therefore a process of production and interpretation of text. The interaction takes place in a social context governed by social-historical context.

In Figure 2.2, I depict the three dimensions of CDA. Fairclough (*op. cit.*) uses the terms description, interpretation and explanation to move from text to the social context and vice versa. While I have used Fairclough's Discourse Analysis three-dimension framework, I have used theoretical lenses to move from "what is said in the text to what can be said from the text" (Ricoeur, 1981:93) about interaction and social context. I will discuss how I hope to do this in Chapter 3.

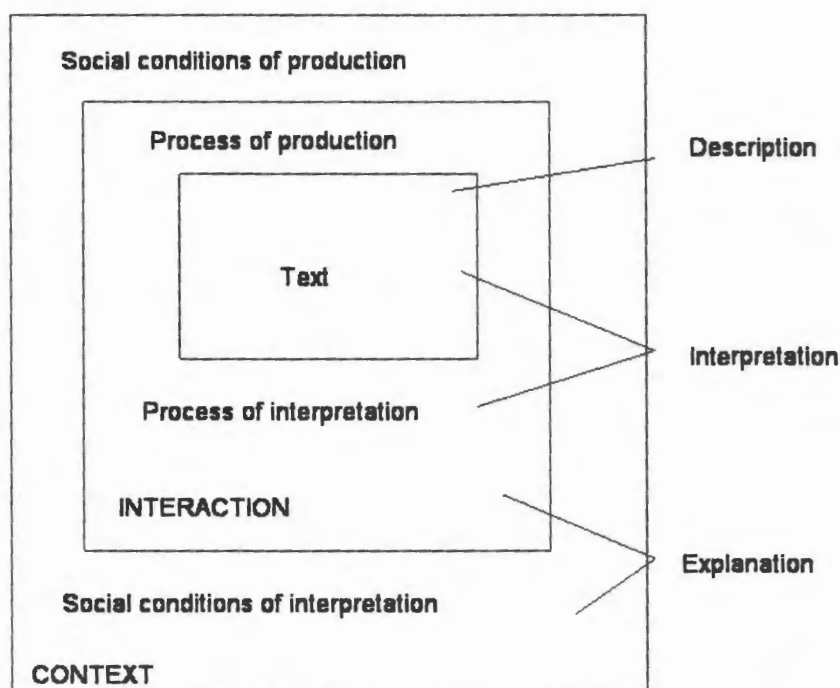


Figure 2.2 Discourse as text, interaction and context (Fairclough, 1989:25)

### 2.5.2.2 Relationship between social action and text

Note that Problem 1.2.3 requires that I use artefacts to gain access to the mental structures of knowledgeable agents. CDA provides a way of thinking that analysing text and discourse practices may give access to social identities and social relations. Phillips and Jorgensen (2002) observe:

*...discourse practices – through which texts are produced (created) and consumed (received and interpreted) – are viewed as an important form of social practice which contributes to the constitution of the social world including social identities and social relations (p. 61).*

The production of text draws its meanings from the social practice and *vice versa*. The discourse theory states, every word we utter draws its meaning from the social practices of which it is a part, or, recursively, from the sediment of prior practices (Burbules and Bruce, 2001). I infer from the discourse theory that the process of production and interpretation of text is not free from the social conditions of production and the social conditions of

interpreting of text. Fairclough (1989:25) points out that discourse involves social conditions of production, and social conditions of interpretation. Fairclough (1992:11) observes that the relationship between social action and text is interaction mediated. Human interaction is a product of social action, and leaves *traces* of its interactive processes that serve as *cues* for interpreting social action.

### 2.5.2.3 Relationship between micro-level and macro-level power structures

In this section, I describe the relationship between *what is said in a text* (micro-level) and *what can be said from the text* (macro-level). It is important that I note in advance here that a back and forth process of moving from *what is said in questions* to *what can be said from the questions* premises my analytical framework discussed in Chapter 3.

Bontekoe (2000:117) postulates that the process of interpretation is a matter not of avoiding our preconceptions, but of testing them against what text presents to us. Bontekoe's argument is that if some of the preconceptions with which we begin seem to appear in the text – then we can hope to understand what we read. This aligns with Heidegger (1962) and Habermas (1995). Accepting this view, it follows that human interaction is a process of constructing and deconstructing existing knowledge.

Preconceptions are mental states, drawn upon during the process of production and interpretation of text. While preconceptions are useful in interpreting and understanding text, they are also barriers to human interaction. Fairclough (1989) refers to these barriers as social and class struggles, which to me are variants of preconception. Fairclough (1989:34-35) observes that,

*...power relations are always relations of struggle, using the term in a technical sense to refer to the process whereby social groupings with different interests engage with one another. Social struggle occurs between groupings of various sorts – women and men, black and white, young and old, dominating and dominated grouping in social institutions, and so on. However, just as class relations are the most fundamental relations in class society, so too is class struggle the most fundamental form of struggle. Class struggle is a necessary and inherent property of a social system in which the maximization of the profits and power of one class depends upon the maximization of its exploitation and domination of another (pp. 34-35).*

These social barriers pose difficulties to the problem of widening access to knowledgeable peers (see Problem 1.2.1). I will address this problem using anonymous communication, which will focus interacting agents on the content of messages and not on the identities of sources. My assumption is that anonymity addresses the social struggle problem and enhances the prospect of resolving Problem 1.2.1. I am mindful of Warnke's (1989) caution that "social phenomena cannot be understood apart from the social wholes in which they are involved and that their relations to other social phenomena – values, practices, institutions, and so on – rather contribute to particular social and historical meaning" (p. 211). My response to Warnke is that this research addresses a practical problem of students consulting with one another and is not merely the social phenomenon of student consultation. In other words, the purpose of this work is to understand the relationship between *what is said during* computer mediated student consultation and *what can be said about* computer mediated student consultation.

#### **2.5.2.4 Anonymous Communication**

When faced with a text, with a known author, a reader may inadvertently interpret the text differently to similar text where the author is *incognito*. Readers know *ab initio* that behind every text is an author and this consciousness means that authors who are highly regarded by the reader may have their text accepted without question. It follows that authorial awareness influences interpretation and meanings made from text. Being aware of the author tends to focus a reader on the author rather than on what the text is saying. Gadamer (1975) argues that "a person who seeks to understand must question what lies behind what is said" and not who said it. This statement suggests that those wanting to understand must focus on the content and not on the source. To this end, anonymous communication allows readers to focus on the content of a message and not on its source. The relevance of these arguments to my thesis is that although authors of messages in a CMC are physically absent, the mere knowledge that authors are peers may influence participation to some extent.

#### **2.5.2.5 Effect of macro-level structures on Information Seeking**

Information seeking is an intentional action driven by an information need. Although information need drives an information seeking process, the expression of a need to start

the process depends on existing knowledge that an information seeker has about the subject for which information is required. Large *et al.* (1999) postulate that,

*Information seekers can be categorized by a variety of other criteria. Does the seeker bring to the search a thorough knowledge of the subject in which to conduct the search, or is the speaker a comparative beginner in the field? The subject specialist's search is likely to be different from the non-specialist's because, for example, the former will have a greater awareness of the subject's terminology, and therefore be better placed to select suitable search terms, including, the necessary, synonyms (automobile)/car) and terms at different hierarchical levels (engine – cylinder – piston) (p. 30).*

My *prima facie* understanding of Large (*loc. cit.*) is that it is possible to distinguish between subject specialists and non-specialists based on the language they use when seeking information. It follows there is a relationship between the discourse of seeking information and the knowledge level of subjects. It therefore seems reasonable to hope that informal knowledge sharing (involving seeking and giving information) gives a way of understanding student macro-level structures. Large *et al.* (1999) add that "...in seeking information, the task is to covert a conscious need into a compromised need. To achieve this compromised level may require considerable effort on the user's part" (p. 32). *Considerable effort* is required to overcome the mental constraints imposed by the medium of language or search engines to bring into expressivity a mental need for information. My argument is that regardless of a medium of communication, expression of information need is constrained mentally and that a human agent is not always aware of the constraints.

The information seeking process involves three steps: information need, information seeking and information use (Loeber and Cristea, 2003:46). I argue that information seeking precedes information need and that expression of need is constrained by existing knowledge, social condition, language, technology etc. A human agent acquires knowledge from societal interactions in which are social conditions. Language and technology have rules that constrain expression of information need and acquisition of information.

It follows from this argument that expression of information need is constrained by social conditions of production and the interpretation of a response influenced by social conditions of interpretation. This point is relevant because it promises to address Problem

1.2.2. While social conditions may affect the production of text, access to produced text by other students may be useful in meeting some unexpressed information needs.

### 2.5.3 Communicative Rationality

In order to distinguish Communicative Action from the human interaction, I will distinguish between rationality and knowledge. Although these two terms are closely related, “knowledge has a propositional structure; beliefs can be represented in the form of statements” (Habermas, 1984:8) while rationality “has less to do with the possession of knowledge than with how speaking and acting subjects acquire and use knowledge” Habermas (*ibid.*). Knowledge is therefore subjective and unreliable.

Habermas (*ibid.*) argues that, the close relation between knowledge and rationality suggests that the rationality of an expression depends on the reliability of the knowledge embodied in it. The significance of communicative rationality in the context of this research is that, the rationality of informal knowledge sharing is dependent on the reliability of the subject knowledge of students under discussion. According to Habermas (1991),

*This concept of communicative rationality carries with it connotations based ultimately on the central experience of the unconstrained, unifying, consensus-bringing force of argumentative speech in which different participants overcome their merely subjective views. This is done through participants owing to the mutuality of rationality motivated by conviction and is assured of themselves both the unity of the objective world and the intersubjectivity of their world (p. 10).*

The argument Habermas (*loc. cit.*) puts forward is fundamental in understanding knowledge construction from human interaction. However, to suggest a central experience in which unconstrained, unifying, consensus-bringing force of argumentative speech is to presuppose an *ad infinitum* of constrained environments in which human beings are expressive of behaviour that may be rational to them but irrational to others. Although such environments are desirable, the reality is that human beings are always constrained (oscillate between what is rational and irrational) and do not therefore speak their *minds*. My contention is that the term *argumentative speech* assumes that participants are unconstrained in their speaking and acting as Habermas (1991) puts it, “argumentation makes possible behaviour that counts as rational in a specific sense, namely learning from explicit mistakes” (p. 22). My point is that given that human speaking and acting is

constrained, it should be possible to allow learning to happen from implicit mistakes (thoughts not expressed in words). According to Habermas (*op. cit.*), “anyone who is so privatistic in his attitudes and evaluations that they cannot be explained and rendered plausible by appeal to standards of evaluation is not behaving rationally” (p. 17). The *privatistic* nature and other factors make it difficult for some students to ask questions in face-to-face forums. They would rather consult informally with peers.

## 2.6 Theories of Text

In the previous section, I discussed the theories of human interaction. I reviewed the concepts of discourse analysis, constructivist discourse analysis and critical discourse analysis. I noted that although discourse analyses differed widely they had a common characteristic of using naturally occurring unedited text. In this section, I will discuss some theories of text *viz.*, hermeneutics, speech act theory and semantic networks.

In the context of this research, text is an outcome of computer mediated human interaction. Text is not an end but a *pari passu* product of a quest for an end. It follows therefore that we can deduce the intended outcome of text from its content. However, the theoretical lens with which we view text influences our interpretation of text. For example, discourse analysis (Section 2.5.1) focuses on discursive patterns in text (Section 2.5.2), on the relationship between text, interaction and social action and on communicative rationality (Section 2.5.3). It follows that text is a medium through which information need is both expressed and satisfied. I have already alluded to the fact that text is not an end but a means. For this reason, human agents have tended to evaluate the outcome of a text and not the text that produces the outcome (Ng’ambi and Brown, 2004). My argument is that it is possible to detect and correct faulty learning (Argyris, 1992) through analysis of text produced in an authentic context.

In Chapter 1, I mentioned that the phenomenon of informal knowledge sharing was elusive. Although the use of CMC promises to address some of the problems I have raised in Chapter 1 Section 1.2, a CMC generated text tends to be ephemeral, hence difficult to capture for analysis.

*Computer-based communication relies almost entirely on plain text for conveying messages. Text is ephemeral, appearing on and disappearing from a screen without any necessary tangible artefacts (Sproull and Kiesler, 1991:40).*

I wish to note that the ephemeral problem is typical in synchronous communication such as chat rooms, instant messaging, etc. The ephemeral problem arises because messages do not persist beyond a chat room session or after an instant messaging session. Synchronous communication does not therefore resolve Problem 1.2.1 and 1.2.2. The alternative approach is asynchronous communication because it allows messages to persist beyond a communication instance and accessible anytime. The advantage of asynchronous communication is that communication results in tangible artefacts. In other words, in asynchronous communication text is both a means of communication and an outcome of communication.

### **2.6.1 Hermeneutics**

In this section, I will discuss the theory of understanding text. The hermeneutics of text is similar to two people engaged in a conversation. Gadamer (1975) argues that,

*Texts are 'permanently fixed expressions of life' which have to be understood, and that means that one partner in the hermeneutic conversation, the text, is expressed only through another partner, the interpreter. Only through him are the written marks changed back into meaning (p. 349).*

In the context of this research, *questions* are expressions of information need understood through a reader. A hermeneutic conversation involves questions and / or responses on one hand, and an interpreter on another hand. The information seeker asks questions which are interpreted by an information giver. An information seeker interprets the information giver's responses. It follows that knowledge sharing is a recursive activity of producing and interpreting text. Although questions are *fixed*, interpretation is not. Ng'ambi (2002a) reports that meanings of questions change as context change. Gadamer (1975) describes the process of understanding text as follows:

*When we try to understand a text, we do not try to recapture the author's attitude of mind but we try to recapture the perspective within which he has formed his views. However, this means simply that we try to accept the objective validity of what he is saying. If we want to understand*



*we shall try to make his arguments even more cogent. This happens even in conversation, so how much truer is it of the understanding of what is written down that we are moving in a dimension of meaning that is intelligible in itself and as such offers no reason for going back to the subjectivity of the author. It is the task of hermeneutics to clarify this miracle of understanding, which is not a mysterious communion of souls, but a sharing of a common meaning (p. 260).*

In the above statement, Gadamer distinguishes between the i) objective validity of what the author is saying ii) subjectivity of the author iii) author's attitude of mind and iv) the perspective within which he has formed his views. I note that objective validity is only applicable to what the author is saying (i), and the rest (ii, iii, and iv) are subjective. Like the author, the reader approaches the text with preconceptions but with a different attitude of mind, and may read a text from a different perspective. To accept the objective validity of the author involves questioning what the author is saying. Gadamer (1975) argues that,

*...a person who seeks to understand must question what lies behind what is said. He must understand it as an answer to a question. If we go back behind what is said, then we inevitably ask questions beyond what is said. We understand the sense of the text only by acquiring the horizon of the question that, as such, necessarily includes other possible answers (p. 333).*

It follows from Gadamer (*loc. cit*) that questioning precedes understanding. In the context of this research, *what is said* is not limited to questions and responses from peers, but also lectures, lecture notes and other reading materials. Understanding of these resources demands that students question what lies behind the materials they read. However, most students entering institutions of higher learning in South Africa are "deliberately disadvantaged (in particular Black Students) by presenting them with a closed, authoritarian approach to knowledge acquisition" (Bradbury, 1997). Hardman and Ng'ambi (2003) observe "...the inability to interrogate text is particularly serious within a university context, where critical questioning underlies engagement with textuality" (p. 139). Questioning based learning does not breed in an *ex cathedra* type of learning environment, and hence the need for informal "anonymous questioning" (Ng'ambi, 2003).

Although Gadamer (1975) stresses the need to question what lies behind "what is said", he does not preclude the need to understand the intentions of the author. He argues that,

*...it must be possible, if we have understood the meaning of a sentence i.e. have reconstructed the question to which it is really the answer, to enquire also about the questioner and his meaning, to which the text is, perhaps, only the imagined answer (p. 335).*

This argument is important to the extent that it informs my research approach in the following ways: first, the “understanding of the meaning of a sentence” in the context of this work is the understanding (analysis) of DFAQ artefacts. Second, the “enquiring about the questioner and his meaning” involves interviewing participants about their meaning of informal knowledge exchange.

### **2.6.2 Speech Act Theory**

Speech Act Theory (Habermas, 1984) has been the foundation of a number of theories and modelling approaches in the area of Information Systems (Van Reijswoud and Mulder, 1998). Reiss (1985) observes that Speech Act Theory is a study of “conversational sequencing and actors’ perception of meaning in conversational exchange” (p. 14). While the theory of Communicative Action uses language as a medium of coordinating social interactions, Speech Act Theory treats language as action. Van Reijswoud and Mulder argue “Speech Act based modelling approaches provide an understanding of organizations that extend on information and document oriented modelling approaches. By focusing on the communication a richer understanding is obtained of the dynamics of an organization, and there with creates richer models.” I do not use Speech Acts in Van Reijswoud and Mulder’s sense of modelling but rather as a medium for achieving understanding of the meaning of computer mediated informal knowledge sharing. There is a relationship between speech acts and *knowledge*.

I will now review the types of knowledge embodied in speech acts.

In Chapter 1, I defined knowledge as an outcome of human activity motivated by natural needs and interests. To view knowledge as such is to view it as a construction from human activity. In the context of this research, human activity involves informal knowledge sharing among students. In Section 2.5.3, I distinguished between knowledge and rationality. I mentioned that knowledge was subjective and that rationality involved how speaking / acting subjects acquire and use knowledge. In this section, I will discuss the

relationship between rationality and knowledge. Figure 2.3 shows the relationship between Speech Acts and Types of Knowledge embodied in them.

Speech Acts \	Types of Knowledge Embodied	Forms of Argumentation	Model of Transmitted Knowledge
<b>IMPERATIVES</b>	Technically and strategically useful knowledge	Theoretical discourse	Technologies Strategies
<b>CONSTATIVES</b>	Empirical-theoretical knowledge	Theoretical discourse	Theories
<b>NORMATIVES</b>	Moral-practical knowledge	Practical discourse	Legal and moral representations
<b>EXPRESSIVES</b>	Aesthetic practical knowledge	Therapeutic and aesthetic critique	Works of art

Figure 2.3: Aspects of the Rationality of Action (Adapted from: Habermas 1984: P. 334)

In the context of this research, all students are capable of rational action. In other words, all students are capable of speaking and acting in ways that allow them to acquire and use knowledge. Depending on how they speak / act, they acquire and use different types of knowledge.

A student or speaker (S) may have an information need (desired state) which she wants satisfied. Let us suppose that this desired state is in the objective world, which means the need is definitive in terms of truth, e.g., *what time is the event starting?* The purpose of the question (speaking) is to want the hearer to satisfy the desired state of *time*. This type of action called an *imperative* is only questionable when the hearer (H) fails to find a connection with conditions of satisfaction. For example, if the (H) does not know about the event, he will not be able to help S reach a desired state. The action of S is teleological (the theory that events and developments fulfil a purpose and must happen because of that). Habermas (1984) put it this way,

*the rules of action embody technically and strategically useful knowledge, which can be criticized in reference to truth claims and can be improved through a feedback relation with the growth of empirical-theoretical knowledge (p. 333).*

This knowledge is both technically and strategically useful and is stored in the form of technologies and strategies.

The other type of speech act is where a speaker desires to represent to the hearer (H) a state of affairs. A speaker (S) may refer to something in the objective world, and want to cause (H) to act on it, e.g., *is it not too cold to play tennis today?* The speaker (S) represents a state of affairs about the weather, and desires that (H) act on whether to play tennis or not. This type of speech act, *constative speech acts*, makes conversations possible. (H), for example, may contest the validity claim raised by (S) for the proposition stated. The action is oriented towards (S) and (H) reaching understanding. With constative speech acts, the truth of statements is subjective, for instance, at which temperature is it too cold to play tennis? When do we say the weather is cold? According to Habermas (1984):

*...when discursive examination loses its ad hoc character and empirical knowledge is systematically placed in question, when quasi-natural learning processes are guided through the sluices of argumentation, there results a cumulative effect – this knowledge is stored in the form of theories (p. 333).*

Unlike constative speech acts that refer to something in the objective world, the *regulative speech acts* refer to something in a common social world for which (S) would like to establish as a legitimate. For example, *do you think music piracy is wrong?* To respond to this question (H) needs to contest the normative rightness claimed by (S) in his action. Habermas (1984) suggests that

*...the type of knowledge embodied in normative regulated speech acts is moral-practical in nature. In moral-practical argumentation, participants can test both the rightness of a given action in relation to a given norm, and at the next level, the rightness of such a norm itself (p. 326).*

Instead of referring to something in a social world, (S) may sometimes refer to something in his subjective world. In this type of speech act, *expressive speech acts*, (S) refers to something in his subjective world, which she would like to reveal to a public. The intention of (S) is to let the public know something about an experience to which he has privileged access. For example, *I am lost and confused. Will you please help?* In this case, (S) reveals to the public his state of mind to which only he is privileged. It is not possible to

know whether (S) is truthful, but (H) *may doubt* the sincerity of self-representation raised by (S). (H) can criticize (S) as being untruthful or reject the statement as deception or self-deception. Self-deceptions require therapeutic dialogue to resolve and aesthetic practical knowledge is an outcome of such dialogue.

### 2.6.3 Dimensions of Speech Acts

There are three dimensions of speech acts: temporal, social and content.

*In the temporal dimension, there is the question of whether participants are oriented more to the future, the past, or the present, or whether the speech acts are temporally neutral. In the social dimension, there is a question whether obligations relevant to the sequence of interaction arise for the speaker, the hearer, or for both parties. In addition, for the dimension of content there arises the question of whether the thematic centre of gravity lies more with objects, the actions, or the actors themselves (Habermas, 1984: 321).*

Figure 2.4 depicts three pragmatic indicators: cognition (C), person (P) and action (A) oriented. Cognition is associated with the *present*, person with the *past*, and action with the *future*. A *cognition oriented* speaker shows that either s/he has taken up the hearer's message or is trying to influence a hearer's view of the world. A *person-oriented* speaker refers to either himself or his past actions or the speaker refers to the person of a hearer or the hearer's past actions. Finally, an *action-oriented* speaker commits himself to a future action or tries to make the hearer do something.

*When a speaker makes a statement, asserts, narrates, explains, represents, predicts, discusses something, or the like, he is looking for an agreement with the hearer based on the recognition of a truth claim. When the speaker utters a first-person experiential sentence, discloses, reveals, confesses, manifests something, or the like, agreement can come about only on the basis of the recognition of a claim to truthfulness or sincerity. When the speaker gives an order or makes a promise, appoints or warns somebody, baptizes or weds someone, buys something, or the like, agreement depends on whether those involved admit the action as right (Habermas, 1984:308).*

I infer from Habermas (*loc. cit.*) that the phenomenon of seeking and receiving information from peers would give a way of understanding claims of truthfulness or sincerity which could be based on misconception or misunderstanding hence allowing consultations to be used to diagnose knowledge levels.

	Speaker (S)	Hearer (H)
	<i>Cognition oriented (C)</i>	<i>Cognition oriented (C)</i>
Present	Does the speaker indicate that he has taken up the hearer's message? <i>Example:</i> agreeing acknowledging rejecting	Does the speaker try to influence the hearer's view of the world? <i>Examples:</i> asserting arguing declaring
	<i>Person oriented (P)</i>	<i>Person oriented (P)</i>
Past	Does the speaker refer to himself and /or his past action? <i>Examples:</i> justifying defending lamenting	Does the speaker refer to the person of the hearer and/or his past action? <i>Examples:</i> accusing criticizing teasing
	<i>Action oriented (A)</i>	<i>Action oriented (A)</i>
Future	Does the speaker commit himself to future action? <i>Examples:</i> promising refusing giving in	Does the speaker try to make the hearer do something? <i>Examples</i> advising challenging ordering

Figure 2.4: Three Pragmatic Indicators (Source: Habermas, 1984:322)

2.6.4 Semantic Networks

I use the term *semantics* to refer to systems of meaning. The system of meaning is useful to understand the construction of knowledge from information shared informally. In other words, semantics refers to systems of understanding collective meaning. Ruqaiya (1996) developed a model of language description depicted in Figure 2.5. Language is part of a human culture and used in the context of normal life. I have used Ruqaiya's model of language description to show that semantics (systems of meaning) is on the one hand, part of the social situation and on the other hand, part of the systems of wording. In the context of this research, I am concerned about semantic networks.

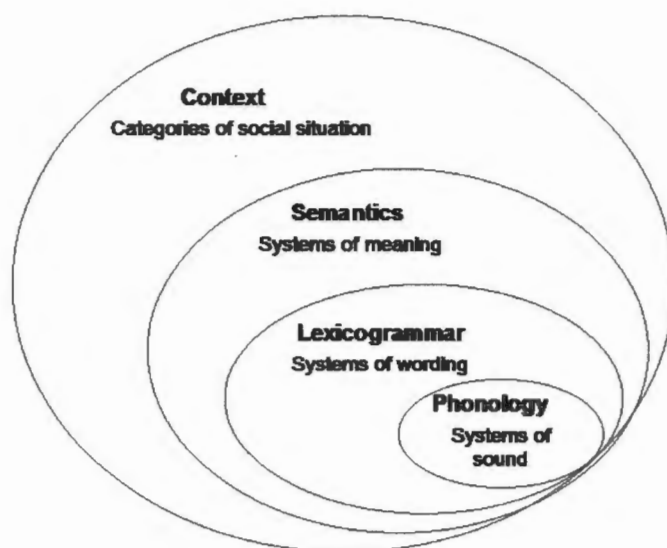


Figure 2:5 Strata for linguistic description (*source: Ruqaiya, 1996: P. 105*)

A semantic network is a computational linguistic theory of structures and processing operations required for computer understanding of natural language (Simmons, 1973:64). Simmons observes that the primary advantage of using semantic nets is the convenience they offer in representing ideas as “deep structure”, “underlying a semantic structure.” It is not just about convenience, as Deliyanni and Kowalski (1979) note: “semantic network data structures provides an indexing scheme and help to guide the search for a solution.” (p. 184). The indexing scheme provides the means of representing ideas such that search for relationships between concepts is possible. The relevance of semantic networks in analyzing questions is that semantic networks give a way of gaining insight into the association between the concepts expressed in questions.

These patterns provide a way of understanding structures that would be otherwise difficult to see from merely reading individual questions. I argue that the semantic network approach will lead to a framework of representing questions as a comprehensive semantic system. This is consistent with Simmons's conceptualization of the goal of a semantic system:

*The computational processes for analyzing language into semantic nets provide a precise description of theory of how some aspects of sentence meaning can be understood as a well-defined semantic system. The term 'understand' is given precise operational meanings through the programs that recognize or generate paraphrases and answer questions (Simmons, 1974:64).*

## 2.7 Theories of Human Action

In Section 2.6, I reviewed some theories of text. In this section, I will review the theories of human action as they relate to the production of text. Giddens (1979) postulates that,

*"...the production of a text, like the production of a social practice, is not the outcome of an 'intention' or an 'aggregate of intentions.' Rather, the intentional characters of the activities concerned are a chronic feature of the reflexive monitoring of action. A text is therefore not to be regarded as a 'fixed form', which is then somehow related en bloc to particular intentions; it should be studied as the concrete medium and outcome of a process of production, reflexively monitoring by its author or reader" (p. 43).*

To treat the intentional character of students exchanging information, as a reflexive monitoring of action, is to allow students to explain why they act as they do. For example, (S) may be desperate because needed information is for an important decision; or (S) may want to have (H) validate her understanding. The actions of (S) would be different in either case.



In Figure 2.6, I define the terms structure, system and structuration in preparation for a discussion on the theory of structuration.

STRUCTURE	Rules and resources organised as properties of social systems. Structure only exists as 'structural properties'
SYSTEM	Reproduced relations between actors or collectivities, organised as regular social practices
STRUCTURATION	Conditions governing the continuity or transformation of structures, and therefore the reproduction of systems

Figure 2.6: Definition of structure, system and structuration (Source: Giddens, 1979: 66)

### 2.7.1 The theory of structuration

Structuration theory argues that structure and agency are so mutually dependent that they are inseparable. According to Giddens (1979),

*...the concept of structuration involves that of the duality of structure, which relates to the fundamental recursive character of social life, and expresses the mutual dependence of structure and agency (p. 69).*

In context of this research, the recursive character of social life suggests that student knowledge is a product of knowledge sharing, and knowledge sharing produces student knowledge. The duality of structure implies that, "the structural properties of social systems are both the medium and the outcome of the practices that constitute those systems" (Giddens, *ibid.*). My argument is that the duality of structure suggests that it is possible to understand structural properties of social systems from practices that constitute those systems and *vice versa*.

The aim of structuration theory is to account for the interplay between human action and social structures, where the notion of *structure* is an abstract rather than a material notion (Monteiro and Hanseth, 1995:328). According to Giddens (1979), "structure forms *personality* and *society* simultaneously – but in neither case exhaustively: because of the significance of unintended consequences of action" (p. 70).

### 2.7.1.1 Unintended Consequence and unacknowledged condition

The theory of structuration, in simplistic terms, states that human beings are unconscious of the social structures that inform their actions. These structures are imprints on the minds, and human actions are a product of these imprints, producing further imprints on the mind. The theory goes further to say that some of the human actions result in unintended outcomes. Giddens (1984) put it this way, "...the unintended consequences of action form the acknowledged conditions of further action in a non-reflexive feedback cycle" (p. 14). It follows that human actions are sandwiched on one side by the unconscious and on the other hand by unacknowledged conditions and/or unintended consequences of action.

Giddens' theory gives a way of thinking that information seeking may result in outcomes not expected by a student. For example, ridiculing a student for asking a question may result in that student never asking questions in public. The *ridicule* is an unintended consequence of an intended action of questioning. Other students watching a fellow student ridiculed, may also never ask questions in public (unintended consequence). In the same vein, a student may ask a question and receive a response that goes beyond the *thinking* of the question. A student, for instance, may not realise that the question could lead to so much debate.

### 2.7.1.2 Duality of Structure

Giddens, in describing the duality of structure, notes that:

*Human actors are not only able to monitor their activities and those of others in the regularity of day-to-day conduct; they are also able to 'monitor that monitoring' in discursive consciousness. 'Interpretative schemes' are the modes of typification incorporated within actors' stocks of knowledge, applied reflexively in the sustaining of communication. The stocks of knowledge which actors draw upon in the production and reproduction of interaction are the same as those whereby they are able to make accounts, offer reasons, etc. (Giddens, 1984:29).*

Giddens suggests two aspects of monitoring of activities: that of self and that of others, and argues that the monitoring affects the discursive consciousness. I infer from Giddens (*loc. cit.*) that the stocks of knowledge from which students draw in formal consultation, is

the same knowledge from which they explain their own actions. This argument suggests a relationship between artefacts of human interaction (text) and human action.

This argument gives hope that the duality of structure in computer-mediated interaction could provide a framework in which to understand informal knowledge sharing.

The Duality of Structure (see Figure 2.7) comprises interaction, modality and structure. According to Giddens (1979)

*...actors in the production of interaction draw upon the modalities of structuration, but at the same time are the media of the reproduction of the structural components of systems of interaction (p. 81).*

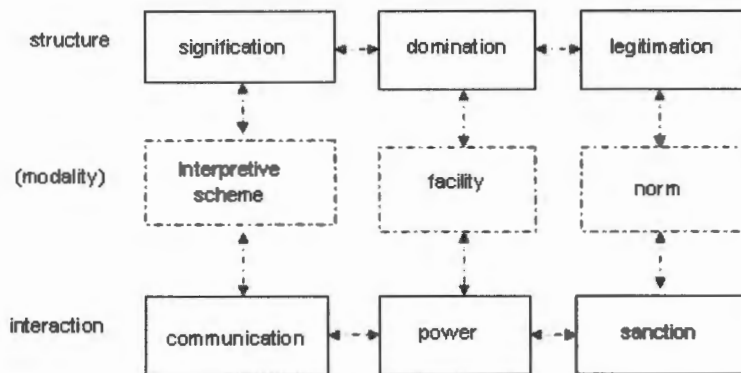


Figure 2.7: Duality of Structure (Source: Giddens, 1979:82)

There are three types of modalities: interpretive scheme, facility and norm. The interpretive schemes according to Giddens (*ibid.*) are

*...standardised elements of stocks of knowledge, applied by actors in the production of interaction. Interpretive schemes form the core of the mutual knowledge whereby an accountable universe of meaning is sustained through and in processes of interaction (p. 83).*

In the context of this research, knowledge is not standardised but is dependent on the rationality of human action (see Section 2.6.2). Giddens (*ibid.*) postulates, "...the communication of meaning in interaction does not take place separately from the operation of relations of power, or outside the context of normative sanctions". In a learning context, knowledge is a resource. When students seek information, they are

mobilising resources and when information is given, they are sharing resources. Giddens (*ibid.*) notes that,

*...the use of power in interaction thus can be understood in terms of the facilities that participants bring to and mobilise as elements of the production of that interaction, thereby influencing its course* (p. 93).

In the context of this study, the facilities refer prior knowledge. I have already mentioned that questions arise from prior knowledge. Students bring to informal consultation different levels of prior knowledge. Questions are a means of mobilising resources. To the extent that communication is anonymous, focuses students on content of a message rather than the source hence rendering interaction for selfish purposes immaterial. Power is futile without resources.

Finally, I will briefly describe the duality of structure:

### **2.7.1.3 Structures of Signification [S]**

Structures of signification involve the interpretive schema through which actors view their world. According to Monteiro and Hanseth (1996) the interpretive scheme “deals with how agents understand and how this understanding is exhibited” (p. 328). Cultural orientation, background, socio-histories, etc. affect how we view the world. For example, respect of the elders is a trait of African culture and many African students have this view of the world. In Ng’ambi and Churchill (1997), we report that most African students from socially disadvantaged backgrounds “are not comfortable with sending a lecturer a question via email”. This sentiment was further investigated in another study in which I (Ng’ambi, 2000a) report that “...42% of the students regarded sending emails to lecturers as disrespectful, and 18% attributed their email ‘phobia’ to their cultural background” (p. 31). I argue that the worldview of actors affect how actors use technology. In this study, the computer mediates informal interaction between fellow students. Understanding the structure of signification demands an understanding of the culture of interacting agents. Culture leaves imprints on the mind and therefore shapes the worldview.

### **2.7.1.4 Structures of Domination [D]**

Structures of domination involve power derived from control of resources. Monteiro and Hanseth (1996) point out that “facility refers to the mobilization of resources of

domination, that is, it comprises the media through which power is exercised” (p. 328). In knowledge environments where information gives a competitive edge, interacting agents tend to withhold information. Interacting agents may strategically withhold information through deception or sharing distorted information.

#### 2.7.1.5 Structures of Legitimation [L]

Legitimation involves norms that govern the actions of actors. In other words, legitimation is the *modus operandi* of interacting agents. In an education setting, academic staff formally teaches students. Information flows from teacher to student. Scheduled consultation involves a student asking questions and a teacher responding. In this study, students consult one another and share information between them. Although students already consult one another informally, making such consultations formal changes the *status quo*. For example, the impact of paying tuition fees on students is two fold: a) students may collaborate, support one another hence making the most of their learning experience; or b) students may entirely depend on the institution to give a value for money learning experience. In either case, the perception of a student influences interaction and informal knowledge acquisition.

## 2.8 Concluding remarks

In this chapter, I have discussed theories of technology-mediated action, computer mediated communication, theories of communication, theories of human interaction, theories of text and theories of human action.

In the next chapter, I will discuss the research approach of this thesis. Given that DFAQ is an organizational memory system (OMS), I will begin with a review of OMS. I then review the interplay between intentions, messages and interpretation. In the reminder of the chapter, I will discuss the research paradigm and methodological issues. I end the chapter with a discussion of the analytical framework.

## Chapter 3

## RESEARCH APPROACH

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## **3.1 Introduction**

In Chapters 1 and 2, I have drawn the connections between the research problem and the theoretical underpinning. In this chapter, I discuss the research approach for investigating the phenomenon. The chapter consists of two parts. In the first part (Sections 3.2 and 3.3), I will elaborate on the Organizational Memory System – OMS and review the relationship between intentions, messages and interpretation. In the second part (Sections 3.4 and 3.5), I discuss the research paradigm, methodological issues and the analytical framework.

In the context of this thesis, I use the terms artefacts, knowledge bases, digital genres and organizational memory synonymously to refer to the DFAQ. The reason for this is, the DFAQ is a record of informal knowledge sharing (artefacts) and contains practices of consultation genres, which is retrievable knowledge and experience (knowledge bases) because it is recorded memory (organizational memory).

I will immediately mention here that digital genres are not the only type of genres. Other genres include communication genre (Yates and Orlikowski, 1992), systems of genre (Bazerman, 1994), genre repertoire (Orlikowski and Yates, 1994) and FAQ digital genres (Antunes and Costa, 2003) to mention but a few. I have referred to DFAQ as a dynamic digital genre or simply as DFAQ genre. The significance of referring to DFAQ as genre is that I envisage that informal knowledge sharing invokes certain discursive practice that is dependent on context and community of users. For example, the discursive practice of medical or chemistry students is different from that of law students. Speech Act Theory (see Section 2.6.2) will give insight into the knowledge embodied in discursive practice from DFAQ artefacts.

In Chapter 1 (see Section 1.5), I mentioned that the research strategy I used to capture data was to introduce the DFAQ into the real world environment because of the elusive nature of the problem, which resisted both observation and capture. The DFAQ was therefore used both as a medium of communication and as an organizational memory system. To this end, I will begin the chapter with a discussion on the organizational memory artefacts.

## 3.2 Organizational Memory System

The terms Organizational Memory (OM) and Organizational Memory Systems (OMS) only began appearing in the IS literature in the early 1990s. While these topics have received some attention from researchers, OMS is not yet considered as a standard topic in the IS curriculum. Pointing out the need for OMS, Linger and Warne (2001) observe, "...the effective assimilation of knowledge into an organization and the organization's ability to learn and construct new knowledge is an imperative for many organizations in this *knowledge millennium*". Linger and Warne (*op. cit.*) contend that OMS helps "to retain knowledge when individuals leave, or when situations change, hence ensuring the viability of the organization in the longer term." The potential of OMS differs from that of Linger and Warne, in that I use OMS as a knowledge sharing resource system which has immediate impact on practices rather than "when individuals leave".

Ackerman (1998) postulates that Information Technology can support organizational memory in two ways, either by making recorded knowledge retrievable or by making individuals with knowledge accessible. Ackerman adds that such an organizational memory system would be most useful if centred on a current organizational activity. In this study, the current organizational activity is informal knowledge sharing.

### 3.2.1 Potential of Collective Memories

Conklin (1996) contends: "it is thus highly desirable to increase the capacity of organizations to remember and to learn". Learning is a knowledge construction activity and unless remembering contributes to learning, remembering is futile. It is impossible to capture and store knowledge, skills and information, but is possible is capture representation from which to extract knowledge, skills and information respectively. Polanyi (1959) argues,

*...words can convey information, a series of algebraic symbols can constitute a mathematical deduction, a map can set out the topography of a region; but neither words nor symbols nor maps can be said to communicate an understanding of themselves. Though such statements will be made in a form which best induces an understanding of their message, the sender of message will always*



*have to rely for the comprehension of his message on the intelligence of the person addressed. Only by virtue of this act of comprehension, of this tacit contribution of his own, can the receiving person be said to acquire knowledge when he is presented with a statement (p. 22).*

It follows from Polanyi's argument that knowledge is stored but re-constructed from words, symbols or maps. I extend the same argument to skills and information. The reader of artefacts contributes her own tacit knowledge to understand collective memories.

Martin (1998) postulates: "OMSs are a research area that aims to enable organizations to capture and exploit knowledge that resides in the collective memories of their employees or members but which is not usually found in any of the formal documents produced by the organization". Martin gives a way of thinking that informal knowledge sharing, in the context of this research, draws from collective memories of students. I use the term *collective memories* to mean *accumulative memories* created over time. I argue that collective memories would lead to understanding the relationship between messages shared informally, and the mental processes of students.

The research approach taken in this study is that of letting students use the DFAQ anonymous consultation environment for informal consultation. This approach is consistent with Conklin (1996) who notes:

*"The most immediate barrier to capturing the flow of communication and making it part of organizational memory is that it seems to present an insurmountable and onerous documentation burden on the people doing the work. The key to overcoming this perception is to shift the notion of capturing the process data from being an additional documentation burden to tapping into the flow of communication that is already happening in an organization."*

Anecdotal evidence suggests that students already consulted one another informally and the provision of a medium to enhance the existing *flow of communication* reduces the need for an *onerous documentation burden on the people doing the work*. Conklin (*ibid.*) observes that despite the potential of organizational memory, OMS is not commonly used. He came up with three possible explanations:

- i. Informal organizational knowledge, like a wild animal, resists capture;
- ii. The usual approach to organizational memory, preserving documents, fails to preserve context; and
- iii. Knowledge loses its relevance, and thus its value, over time.

It is for reasons such as those given above that the use of DFAQ was an authentic context of student learning. Theoretically, DFAQ was an anywhere, anytime consultation space. The next stage was to analyse artefacts: the discursive practices of knowledge sharing, speech acts and human interaction. Thus, the DFAQ is a knowledge-sharing environment based on questions premised on knowledge management architecture. A knowledge management architecture that supports a learning organization ought to meet the following criteria (Linger and Warne, 2001):

- i. Accommodate actors in their ability to act effectively as individuals, and members of a community of practice, within an organization;
- ii. Incorporate processes that enable the actors to perform their tasks, learn and engage effectively in knowledge work as well as providing the means to objectify and document their understanding of tasks.

### **3.2.2 Artefacts from human actions**

Dix *et al.* (2003) argue that artefact centred sources are particularly useful where an activity occurs or is active only infrequently so that direct observations may fail to record any instance or part of the activity at all. Informal consultation is an infrequent activity and is therefore difficult to observe. It is for this reason that technology mediated consultation facilitates both the accomplishment of the task of consultation, and the tracking of artefacts. Jones (1999) cites Orlikowski who defines technology as 'material artefacts (various configurations of hardware and software)', but also claims that this does not imply an exclusive focus on technology as a physical object. Rather, she argues, the 'analytical decoupling of artefacts from human actions allows material artefacts [to be conceptualized] as the outcome of coordinated human action and hence inherently social'. Dix *et al.* (*op. cit.*) observe that ethnographic literature is full of the importance of artefacts as the means with which individuals represent, mediate and negotiate work in collaborative settings.

### 3.2.3 Types of messages in artefacts

I am particularly concerned with two types of messages, ostensive and internally experienced messages. Ostensive messages are the actual text (can be verbal, non-verbal, paralinguistic cues, or artefacts) and internally experienced messages are the interpretations of these ostensive messages and represent the intentions of the sender and the interpretations of receiver(s) (Stohl, 1995:50). My thesis is that capturing and analyzing informal messages as they happen within an authentic information exchange should lead to useful insight on the intentions of a sender and the meaning-making process of a receiver, hence provide diagnostic information. My argument is that this approach leads to coherent organization memory, without additional documentation effort. It is a non-trivial task to find the right balance between coherence and documentation effort as Conklin (1996) rightly observes:

*Groupware tools such as e-mail tend to make informal knowledge explicit, but they generally fail to create a coherent organizational memory. On the other hand, attempts to build organizational memory systems have generally failed because they required some additional documentation effort with no clear short-term benefit, or, like groupware, they did not provide an effective index or structure to the mass of information collected in the system.*

In this study, the use of DFAQ makes informal knowledge explicit and the fact that DFAQ interaction is restricted to questions and response creates coherence. The DFAQ environment uses a dynamic Intelligent Questions and Response Handler (discussed in Chapter 4) to reduce the need for documentation.

## 3.3 Intentions, Messages and Interpretation

In the previous section, I distinguished between ostensive and internal messages. The DFAQ captures ostensive messages in the form of questions. These questions (messages) are expressions of intentions or carriers of the sender's intention. In this section, I will discuss the relationship between intentions, messages and interpretation.

3.3.1 Intentionality and Expressivity for Information Exchange

With the help of Figure 3.2 below, I will describe the relationship between intentionality and expressivity for information exchange. The purpose of this discussion is to give a background to the analytical framework that I discuss in Section 3.5.

Information seekers (IS) are not *tabula rasa* waiting to accept any information that arises from their questions. Information givers (IG) do not approach text free of preconceptions. Both IS and IG have collective memories from which they draw during the production and interpretation of messages. Ostensive messages are a product of internal messages, and produce internally experienced messages. The DFAQ mediated communication allows IS and IG to exchange information while located in an authentic social context. The DFAQ artefact is an audit trail of interaction. However, these artefacts do not contain the intentions and interpretations of messages. My thesis proposes the use of a multiple *theoretical lenses* to provide insight into the thoughts or internally experienced messages of seekers and givers of information.

The interaction of IS and IG presupposes that there is some mutual understanding of the context of intentionality in which the information sharing is taking place. In the absence of such understanding, the interaction would be meaningless. For example, when an IS asks a question, *what is life?*, the mutual understanding of the context of intentionality will guide how the IG respond to it. For instance,

IS	Mutual Intentionality Context	IG
<i>What is life?</i>	[Philosophy]	R1
<i>What is life?</i>	[Religious]	R2
<i>What is life?</i>	[Rhetoric]	R3

Figure 3.1: Intentionality Context

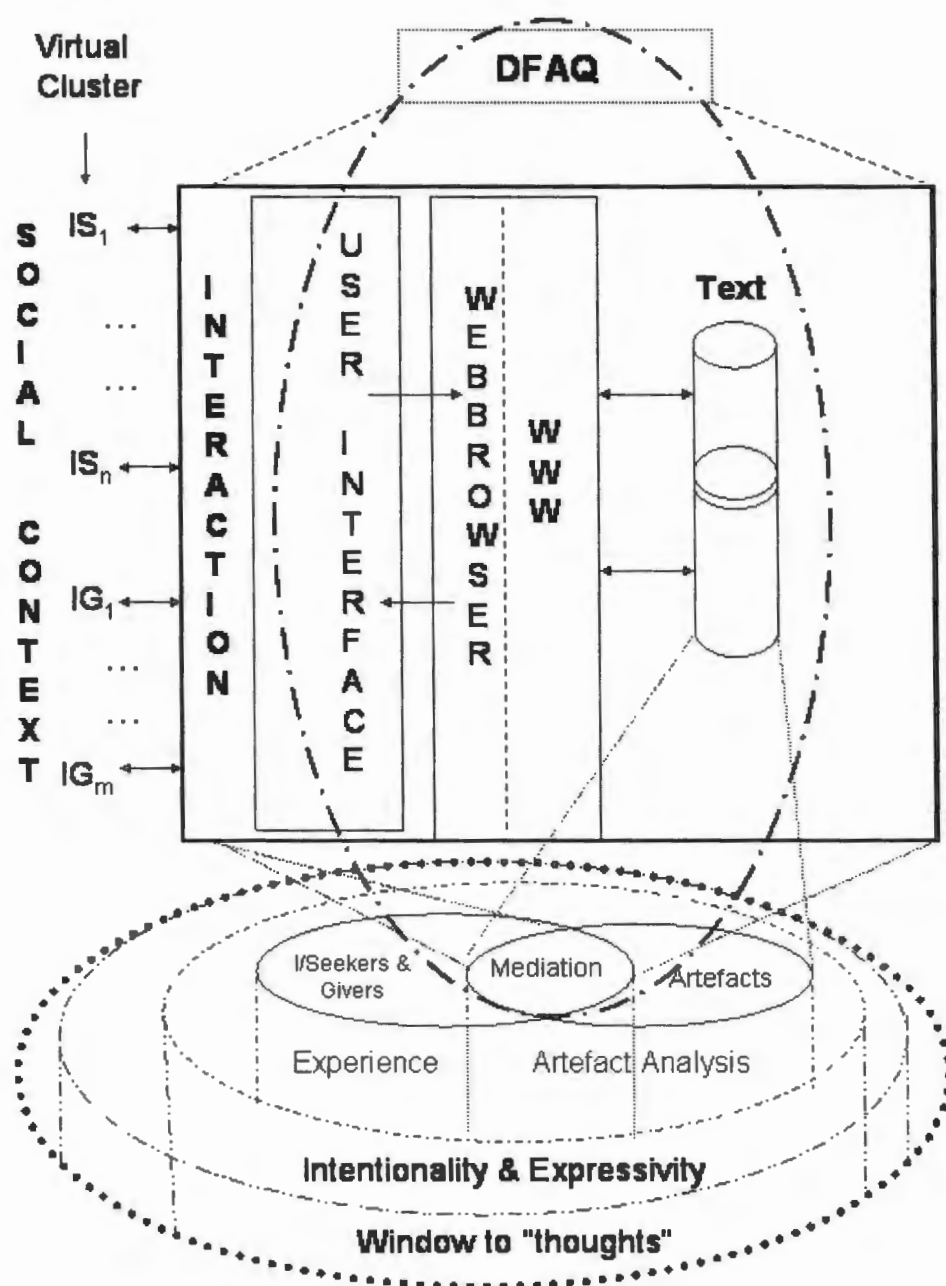


Figure 3.2 Intentionality and Expressivity for information exchange

Both the IS and the IG assume an understanding of the mutual intentionality context (see Figure 3.1). Pujol (1999) observes:

*...participants would have to be mutually aware of other people's intentions and their discursive actions depend on such understanding. The 'intention' of the text' opens the door to an entity outside the immediate textual interaction (p. 88).*

I infer from Pujol that a question, for example: what is life? opens a door to a world outside the textual interaction. In other words, it allows a hearer to ponder either *philosophically* or *religiously*, depending on the mutual intentionality context, in ways that could go beyond the intentions of its author.

Interpretation of text is subjective and not therefore guaranteed to be the same between the sender and receiver of a message. Pujol (*ibid.*) stresses:

*...understanding emerges from the prejudices and preconceptions of the reader and not despite them. The horizon of the interpreter is an essential component in the understanding of the horizon of the text and, therefore, interpretation is not a process of revealing the text but of fusion with text. It is precisely by acknowledging the distance from the 'other' that meaning is produced (p. 89).*

The term *fusion with text* suggests uncovering what lies behind a text through the prejudices and preconceptions of the reader. This view is consistent with Gadamer as Weinsheimer (1985) observe "...thus the question raised by the text merges with the interpreter's own questioning in the dialectical play which Gadamer calls the fusion of horizons" (p. 210).

### 3.3.1.1 Knowledge Sharing between IS and IG

In Chapter 1, I mentioned that students did not have access to knowledgeable peers and that consultation was limited to clusters of friends. In Figure 3.2, I depicted a virtual cluster of social interaction between IS and IG mediated by the DFAQ environment. Unlike physical clusters, virtual clusters are size, time and location independent. The DFAQ is a medium of communication through which information seekers meet information givers. DFAQ is a web-based environment with a database backend to keep track of the transactions of interaction. I will describe the DFAQ in detail in Chapter 4. At this point it is important to know that DFAQ records human interactions (IS and IGs).

### 3.3.1.2 Intentionality and Expressivity

In illustrating intentionality and expressivity, I have re-conceptualised artefacts as an outcome of interaction. The DFAQ list is an outcome of DFAQ mediated interaction. In other words, as IS and IG consult with one another through a DFAQ environment, the outcome is a DFAQ knowledge resource.

The implication of this view of knowledge is that I will need to use different types of lenses to gain insight into the type of knowledge embedded in artefacts. It is for this purpose that I will use the theories of text to analyse DFAQ artefacts.

In Chapter 2, I distinguished between intentions and goals of a message (illocutionary) and the effects of a message (perlocutionary). An author of a message will have intentions for asking a question. It is not always possible to anticipate the effects of a message. Although an author may hope that a message will have particular effects, there may be unintended consequences.

### 3.3.1.3 Information Seeking Process

An information seeking process requires that *intentions of need* are intelligible to information givers. This view presupposes that the information giver receives the message. The role of information systems is not just to allow messages from a sender to reach the receiver but also communicate intentions through messages. Lyytinen and Klein (1985) observe:

*Information systems would be useless if they could not assist the sharing of meaning and knowledge, and users of information systems do, at least partially, understand the meaning of messages which they put into, and receive from the system (p. 226).*

Lyytinen and Klein suggest that users of information systems know what they mean, albeit only partially, when sending a message, and understand the messages they receive. It therefore follows that communication is between a sender and a receiver and not necessarily with a technology. Technology facilitates knowledge sharing. Stenmark (2001) put it this way: "We should not look on technology alone as the solution to our problem

of finding and sharing knowledge but at best, as a facilitator that helps us initiate and sustain social interactions.” (p. 11). In this study, DFAQ facilitates communication between information seekers and information givers; and questions open conversation. Weinsheimer (1985) contends:

*To open a conversation with a text means to understand the question to which the text is an answer as an open question. If it is an open and not a closed question, then the answer the text gives is definitive. Even its answer raises a question, one that is still open to discussion. To open a text to discussion means to open its topic to the interpreter's contributions. It becomes open to interpretation, by which the conversation is furthered (p. 210).*

My argument is that anonymous communication makes it possible to have conversation with a text. In the context of this study, text refers to questions and responses from peers. DFAQ mediated interaction is largely synonymous with text mediated interaction.

Text is an explicit expression of human intentionality. In this study, I am concerned with short text messages (*viz.* questions) in which the reader interprets text and produces it. The medium of production and transmission of text imposes conditions on interaction, which may influence the expressivity of intentions. For example: a user whose intention is to seek information that compares traffic of short text messages (SMS) between South Africa and the United States may have the following intention: *How does SMS traffic in South Africa compare with that of the United States?* The expression of the intention may be constrained by the rules and conditions imposed by a mediating tool. In this case, the user types: SMS + South Africa + USA. Figure 3.3 shows how the use of a mediating tool (Google Search Engine) may constrain the expression of intention. The user interprets results and decides whether to use the information or not.





Figure 3.3: Google Search Engine constrains expressivity

It is the information seeker and not the giver, who determines whether information is useful, relevant or adequate. The process of evaluating information is subjective in that the receiver brings to the interpretation process prejudices and preconceptions. Interpretation of messages is a recursive process involving construction and de-construction of understanding.

### 3.3.1.4 Transformation of needs into ostensive messages

Stohl (1995) categorised messages into three groups: “messages having intentions of senders (what is desired and intended); ostensive message (what is actually verbalized); and receivers’ interpretations (how the reader interprets the message)” (p. 53). Most information seeking activities are question driven. An information seeker would often have questions needing an answer, or doubts needing clarification or explanation. Often, questions do not convey details of context or situation that have led to the question but rely on the receiver’s interpretation to uncover the missing information.

An ostensive message becomes a conveyor belt of intentions. Given that the messages are in a shared language (such as English), it seems reasonable to expect that a receiver will

interpret the message as closely to the meaning of the information intent as possible. A sender may choose to obscure the intent for seeking information if they consider this strategic. Anecdotal evidence suggests that human actors use ostensive messages strategically to mobilize resources that help them achieve desired goals. The strategic approaches to information seeking activity is bounded within a social context of human actors that I assume has an effect on how information needs are transformed into ostensive messages.

### **3.3.1.5 Return journey from Messages to Intentions**

This journey begins with the assumption that messages convey intentions. It follows that we can understand intentions from messages. To the extent that messages are expressed thoughts / intentions, it seems reasonable to expect that we can learn about how human actors think from the messages they generate. In the same vein, I hope that it is possible to track and monitor how human actors learn by observing patterns from messages. The question one would like to ask at this stage is, what is the value of understanding human thoughts from messages they generate? Firstly, it is an impossible task to gain understanding of what humans think without them saying anything.

In a classroom, an expository approach of teaching where a professor is the only active member of a class delivering lectures and students learn passively, it is not possible to know whether learning takes place. It is not possible to know whether human actors are confused or have misunderstandings until they verbalise their thoughts. If messages are products of thoughts, and those thoughts are products of messages, then messages are a window to human thoughts.

A message is not only an expressive vehicle of intention but is also a process of power through which resources are mobilised. Although the objective of messages is communication, the intentions of messages are much deeper than mere communication. Intentions may include mobilization of resources. In the context of this research, the mobilization of resources involved understanding academic materials in order to pass the course and graduate. Rasmussen (1996) argues: "...in communication technology, rules and resources are mutually dependent. Without one another, they have no meaning" (p. 182). According to Rasmussen technology-mediated communication is based on rules and resources which are reproduced through both expressive verbal and non-verbal practices.

Rasmussen (*ibid.*) contends: “Rules and resources are *effects* of regularised communicative practices and manifest conditioned and contextual properties of the same” (p. 166).

### 3.3.1.6 Social System of Interacting Individuals

The intentionality and expressivity for information exchange (see Figure 3.1) happens in a social context. In Section 3.3.1.1, I mentioned that information seekers and givers consulted with one another through the DFAQ space. This in essence means that DFAQ mediates social interaction. Given that the focus of this study is informal knowledge exchange, which inevitably involves interacting individuals, suggests that DFAQ is a technically implemented social system. This view has implications for the assumptions that I have had to make in investigating the phenomenon (see Section 3.4.1 below).

Many learners work in small teams (clusters), consult each other within the cluster and when stuck either consult other clusters or together consult the educator or tutor. Sproull and Kiesler (1991) suggest: “limiting interaction and information exchange to like-minded colleagues shields people from unnecessary information. It also can lead to organizational disaster by separating people from information they need to know” (p. 42). I infer from Sproull and Kiesler that *limiting interaction and information exchange to like-minded colleagues* impairs organizational learning which in turn precipitates organizational disaster. My argument is that to the extent that organizations are social systems with individuals pursuing multiple goals, networks exist only as temporal structures and are dynamically constituted in space and time dictated by changing persuasion of objectives. Stohl (1995) conceptualizes an organization as “identifiable social systems of interacting individuals pursuing multiple objectives through coordinated acts and relationships” (p. 23). Stohl’s thesis of an organization as a social system of interacting individuals allows us to think of a network of small groups each engaged in organizational communication leading to a complex network of information exchange.

This study requires that I understand the phenomenon of informal knowledge sharing hermeneutically. Burrell and Morgan (1979) postulate: “hermeneutics is concerned with interpreting and understanding the products of the human mind which characterise the social and cultural world” (p. 235). I argue that questions are a product of the mind and characterise the social (interaction) and cultural (language) world. Burbules and Bruce

(2001) observed that students considered their interaction with peers as being more important than their interaction with teachers.

*For many students, learning opportunities in the classroom are supplemented and sometimes overshadowed by opportunities outside of it in other peer interactions, for example. It is hardly news that, at certain ages especially, interaction with peers in schools is much more important to many students than their interactions with the teacher (Burbules and Bruce, 2001).*

No research seems to exist that focuses on what teachers can learn from informal messages students exchange with one another. An institution of learning is a “social system of interacting individuals” (Stohl, 1995:23) and “often discovers faulty learning (Weick, 2001:704)” only when students experience failure.

I have so far discussed the potential of collective memories of interacting individuals, the artefacts from human actions and types of messages. I have also described the relationship between intentionality and expressivity from an information seeking perspective. In the next section, I will discuss the research paradigm, methodological issues and the analytical framework.

### 3.4 Research Paradigm and Methodological Issues

In this section, I will discuss the research assumptions that informed my choice of a research paradigm and methodological issues. In Figure 2.1, I identified three objects of study, i.e. text, interaction and social context and discussed the theories that underpin each of these objects. In the first part of this chapter, I have shown the difference between ostensive messages (questions) and internally experienced messages (mental structures). I have theorised that questions are expressions of intention and that the receiver or reader approaches the process of interpretation with prejudice and preconceptions.

Figure 3.4 depicts that text is an outcome of intentionality, interactivity, expressivity and sociality. I have used Figure 3.4 to anchor the research approach and methodological issues discussed in the rest of this chapter.

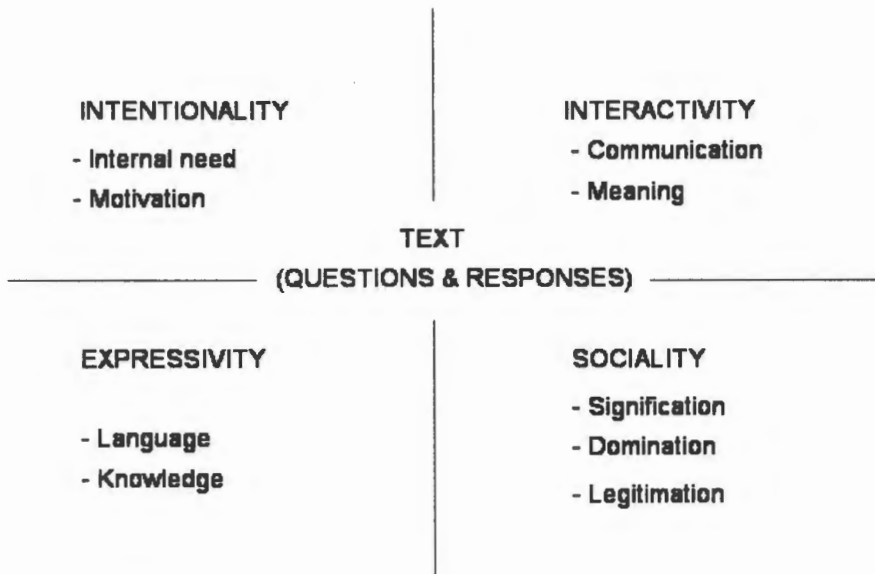


Figure 3.4 Four Quadrants of Text

### 3.4.1 Interpretive Research Paradigm

I will now discuss assumptions upon which I base my analytical framework. I begin by stating that I am using an interpretive research paradigm. Burrell and Morgan (1979) argue:

*...the interpretive paradigm is informed by a concern to understand the world as it is, to understand the fundamental nature of the social world at the level of subjective experience. It seeks explanation within the realm of individual consciousness and subjectivity, within the frame of reference of the participant as opposed to the observer of action (p. 28).*

The interpretive research is new in IS as Vessey *et al.* (2002) observe: “this type of research is new to many of us and it will take time to gain the experience necessary to produce high quality articles” (p. 166). According to Vessey *et al.* (*op. cit.*) an interpretive approach has been used to “add greater richness to the interpretation of the IS phenomena” (p. 135). The greater richness to interpretation of the IS phenomena, according to Burrell and

Morgan, 1979) is added because “interpretive philosophers and sociologists seek to understand the very basis and source of social reality. They often delve into the depths of human consciousness and subjectivity in their quest for the fundamental meanings which underlie social life” (p. 31). Although the need to add greater richness to the interpretation of IS phenomena may be attractive, not every research renders itself to an interpretive research paradigm. Klein and Myers (1999) argue:

*IS research can be classified as interpretive if it is assumed that our knowledge of reality is gained only through social constructions such as language, consciousness, shared meanings, documents, tools and other artefacts. Interpretive research does not predefine dependent and independent variables (p. 69).*

The interpretive argument as Garrick (2000) put it is that: “an individual’s experience is best understood from the standpoint of the social world of that individual.” (p. 209). Interpretive studies share the following assumptions (Candy, 1991:432 cited in Garrick, 2000:208):

- The aim of inquiry is to develop an understanding of individual cases rather than universal laws or (predictive) generalizations.
- Causes and effects are mutually interdependent and any event or action is explainable in terms of multiple interacting factors, events and processes.
- The social world is not objective – it is extremely difficult to attain complete objectivity, especially in observing human subjects who may confuse or make sense of events based on their individual systems of meaning.
- The world consists of tangible and intangible multifaceted realities best studied as a *whole* rather than fragmented into dependent and independent variables. This recognizes the significance of the context in which experience occurs.
- Inquiry is always value-laden and such values inevitably influence the framing, focusing and conduct of research.

I will briefly comment on these assumptions in terms of how they relate to this research. As mentioned in Chapters 1, 2 and the first part of this chapter, the aim of this research is to develop an understanding of individual cases of student informal knowledge sharing rather than universal laws or generalizations. The underpinning theories serve as lenses through which I *see* and gain understanding of the phenomenon. Klein and Myers (1999)

observe that, “theory plays a crucial role in interpretive research, and distinguishes it from just anecdotes. However, theory is used in a different way than is common in positivist research; interpretive researchers are not so much interested in ‘falsifying’ theories as in using theory more as a ‘sensitizing’ device to view the world in a certain way” (p. 75). My use of theories is therefore for sensitization rather than falsification. Klein and Myers (*ibid.*) observe, “...interpretive researchers in information systems tend not to generalize to philosophically abstract categories but to social theories such as structuration theory or actor network theory” (p. 75). My conception of duality of structure is that there is an interdependency of causes and effects, structure and human actions.

Human interaction is a social activity and like any social world, it is extremely difficult to attain complete objectivity. For this reason, I will use a hermeneutic circle approach. The idea of the hermeneutic circle suggests that we come to understand a complex whole from preconceptions about the meanings of its parts and their interrelationships (Klein and Myers, 1999:71). In the context of this research, the DFAQ artefacts (questions and responses) represent the parts while the complex interrelationship (see Figure 3.2) is the whole. Klein and Myers’ (*loc. cit.*) use of the term *come to understand* does not suggest having a final word as Weinsheimer (1985) contends:

*...for hermeneutics conceived as a method, projecting a whole also means anticipating a limit. This is the whole which, when finally filled in, marks the completion and cessation of interpretation and the final overcoming of our prejudices. Certainly, we do have experiences of enlightenment when we say, “Now I finally understand.” Yet our own understandings, like those of our predecessors, however apparently definitive, never seem to be the last word. This lack of finality does not necessarily imply we have overcome some part or failed to understand the whole. On the contrary, it is in principle possible to have overlooked nothing whatever, and yet the total comprehension so achieved will not be only an understanding of the whole per se but a coming to an understanding with the whole – a joint understanding and a joining of traditions (p. 177).*

The process of coming to an understanding with the whole is iterative as Klein and Myers (*ibid.*) explain: “the intellectual basis of the research design provides the lenses through which field data are construed, documented, and organised. It could be that the research findings do not support these preconceptions. Therefore, they may have to be modified or abandoned altogether. This process is one instance of the hermeneutic rule that

‘prejudice’, ‘prejudgement’, or prior knowledge plays an important part in our understanding” (p. 76).

### 3.4.2 Action Research

In the previous section, I discussed an interpretive paradigm and hermeneutics of the social world under investigation. In this section, I elaborate on how I will conduct the study.

To the extent that I am concerned with gaining insight into students’ experience of knowledge sharing based on questions, I will need to understand the phenomenon from the standpoint of the social world of a student. In Chapter 1, I mentioned that the object of study is elusive and are therefore extremely difficult to observe when they take place. In Chapter 2, I identified three objects of interest namely: text, interaction and social context. Text is an artefact of informal consultation and is critical to understanding interaction and social context. My approach is to use a special CMC tool (DFAQ) to mediate and capture informal consultation. I will then gather stories (experience) from DFAQ users about their knowledge sharing experience.

Action research is a valid approach of researching IS as Fitzgerald (2001) observes, “one of the most promising signs of recent times has been the increased legitimacy of action research as a valid means of researching Information Systems.” Fitzgerald (*ibid.*) argues that:

*Among the central tenets of action research are that it should take place in a realistic context, and that the research should help solve some problem faced by the organizational participants.*

Wood-Harper (1985) contends that Action Research “stems from the behavioural sciences based on the principle that the researcher is within the field of that research and becomes a partner in the action and process of change” (p. 178). Action Research is both participatory and collaborative and “action researchers are authentically engaged, as individuals, in the process of enlightenment, and democratically involved, as members of collaborating groups, in the process of organizing action” (Carr and Kemmis, 1986:198). I use the term *change process* as used in IS and not in the behavioural sciences.

Hirschheim *et al.* (1995) explain that in IS *change process* is an event in which a phenomena, i.e. objects, properties and their relationships in object systems, come into being as a result of a development group’s deliberate action” (p. 16).



Accepting Wood-Harper's (*loc. cit.*) view of Action Research, this study is located within an academic institution in which the researcher is a staff member and concerned about informal knowledge exchanged among students and the untapped potential to learn from this activity. The DFAQ environment is a *partner in action* to the extent that DFAQ is not only a medium of communication but also a resource that facilitates knowledge sharing. The DFAQ artefact analysis will be useful for designing improvements to the communicative environment, while simultaneously providing peer-based learning support and giving teachers diagnostic information about student learning.

This approach is consistent with the outline of Action Research by Carr and Kemmis (1986) who note that:

*Any action research study or project begins with one pattern of practices and understandings in one situation, and end with another, in which some practices or elements of them are continuous through the improvement process while others are discontinuous (new elements have been added, old ones have been dropped, and transformations have occurred in still others). Similarly, understandings undergo a process of historical transformation. In addition, the situation in which the practices are conducted will also have been transformed in some ways (p. 182).*

While Carr and Kemmis give an overview of Action Research, they do not give guidelines on using it as a method of analysis. Action Research is "a method of analyzing social relations within organization" (Checkland and Holwell, 1998:76). Checkland and Holwell (*op. cit.*, p. 77) contend that action research analysis is to be based on

- the historical development of the organization's role structure and pattern of interaction;
- the nature of the involvement of ideal-type actors and the ends they pursue, that involvement deriving from experience both within and outside the organization;
- the definition of their situations which these ideal-type actors offer, and their expectations of the likely behaviour of others, especially with regard to disposition of organizational resources;
- the typical actions of different actors and the meaning they attach to the action;
- the nature and source of the intended and unintended consequences of these actions, and the effects on the institutionalized role expectations;

- changes in actors' involvements and ends, and changes in the role system, brought about by both internal and external transformations.

Checkland and Holwell (*ibid.*) observe: "an analysis of this kind would clearly create a very different agenda from that derived from seeing an organization as a goal-seeking machine and its implications for organizational information systems would be very different" (p. 77).

### 3.4.3 Social Realities of Knowledge Sharing

Monteiro and Hanseth (1996) observe that in studies where "subjects interpret, appropriate, and establish a social construction of reality, simple-minded, deterministic approaches should be avoided" (p. 327). Some of the examples of studies on organization communication that have used simple-minded, deterministic approaches are (Fritz *et al.* 1998; Kahai and Cooper, 1999) and those that have avoided the trap are (Ngwenyama and Lee, 1997; Cecez-Kecmanovic and Webb, 2000). An example of a deterministic approach is the work of Kahai and Cooper (1999) who set out to "better understand the comprehensive relationships among CMC, group processes, and group outcomes". Kahai and Cooper's aim was to investigate the extent to which members of a group solving a problem held similar views and solutions about the problem at the end of their task. They used a questionnaire. Below are extracts of two questions:

Y7. *To what extent are your views about the topic of discussion DIFFERENT from those of others in your group? (1=not different at all, 4=to a moderate extent, 7= to a large extent)*

Y8. *Describe the similarity of your views to others in your group about the topic of discussion? (1=very different, 4=moderately different, 7=very similar) (Kahai and Cooper, 1999:188)*

The above questions are both simplistic and deterministic. To the extent that my study is concerned with how subjects construct social reality and how subjects articulate their experiences, I will avoid the use a simplistic and deterministic paradigm. Nevertheless, I share the view of Checkland and Holwell (1998) who note:

*Methods of natural science, extremely productive in enabling external observers to discover the regularities of the natural universe, are exceptionally difficult to apply to human affairs. This being so, we can be sure that the difficulty applies to work on information systems in organizations (p. 19).*

With a background in Mathematics and Computer Science, I am a natural scientist but it seems unreasonable to use natural science methods for the study of IS as a social phenomena. Hirschhlein *et al.* (1995) point out and rightly so that “knowledge about human means and ends is not easily obtained because reality is exceedingly complex and elusive. There is no single reality, only different perceptions about it.” (p. 74). Given that this study seeks to investigate experiences of human actors in an organization engaged in a CMC, actors have different perspective and realities. Fitzgerald (2001) notes that, “multiple realities exist as subjective constructions of the mind. Socially-transmitted terms direct how reality is perceived, and this will vary across different languages and cultures, and historical time-periods”.

## 3.5 Analytical Framework

I now have discussed the background information leading to this section. My aim in this section is to describe how I intend to use the theoretical approaches and theories discussed in Chapter 2 in the context of an interpretive action research. This section is important for two reasons: a) it serves as a link to my discussion so far, and my discussion hereafter; b) I will use this framework to analyse empirical materials in Chapter 5.

As a prelude to the analytical framework, my objective is to develop a framework that mediates between social practices and use of language on the one hand; and mental structures and intentional actions on the other hand. In the context of this research, social practices refer to student informal knowledge sharing, mental structures refer to what students know. The use of language refers to asking of questions, and intentional action is the willingness or lack of it to share information. These different interests suggest that there is need for triangulation of methods. I have chosen to use CDA as an arching theory encapsulating other theories because “CDA is not a single method but constitutes itself at different levels – and at each level a number of selections have to be made” (Meyer, 2001:14). To this end, a CDA based framework would allow different theories to dialogue.

### 3.5.1 Motivation

In Chapter 2, I discussed CDA as a theoretical perspective of human interaction (see Section 2.5.1) and Structuration Theory as a theoretical perspective of human action (see Section 2.7.1). These two perspectives are fundamental to the understanding of DFAQ mediated informal knowledge exchange. I have already alluded to the fact that I am concerned with understanding what lies behind informal messages exchanged among students.

CDA as a methodology is underpinned by various theories including “theories on society and power, theories of social cognition and grammar, and borrows from a larger theoretical traditions” (Meyer, 2001:18). I infer from Meyer (*loc. cit.*) that the idea to use various theories to underpin different levels of CDA (i.e., text, interaction and social context) is therefore not new. The problem, however, as Meyers observes is that “there is no guiding theoretical viewpoint that is used consistently within CDA, nor do the CDA protagonists proceed consistently from the area of theory to the field of discourse and then back to theory” (p. 18). Thus, I propose a framework (see Figure 3.3) for analysing artefacts of computer mediated communication (messages) that provides a way of proceeding from an area of theory to the field of discourse and *vice versa*.

My argument is that for CDA to be of use in IS, there is a need for a framework to guide both IS researchers and practitioners on how CDA can be used as a research framework.

From a methodological point of view, it makes sense to provide an operational strategy for GST and a theoretical premise for CDA as explained below:

- In their recent review of Structuration Theory and information systems research, Jones and Karsten (2003) report that 225 information systems articles published in leading journals and conferences between 1986 and 2002 used Giddens’ work. The increasing citation of Giddens’ work in IS research coupled with the growing gap between theories and methods, creates a need to research methodologies that would contribute to improving the application of Structuration Theory in IS research. Rose (1998) observed that although Giddens’ Structuration Theory (GST) has been used as an Information Systems (IS) theory, little attempt has

been made to *operationalize* the theory. My thesis contributes a methodology that potentially allows IS researchers to apply Giddens' Structuration Theory in a particular sub-field.

- Thompson (2002) recasts CDA as a method that links texts at a micro-level (the textual level) with macro-level structures (social-cultural practice). Although Thompson does not mention Giddens' Structuration Theory, his macro-level view of CDA renders itself as a potentially suitable *partner* for Structuration theory. Structuration theory lacks methods to put it into practice and CDA lacks theoretical underpinning. Referring to CDA as a method, Meyer (1991:18) noted, "there is no guiding theoretical viewpoint that is used consistently with CDA, nor do the CDA protagonists proceed consistently from the area of theory to the field of discourse and then back to theory".
- Tatyana and Huub (2004) observe that: "Newcomers in discourse analysis experience a squall of philosophical-sociological-linguistic discussions, but shortage of clear procedures. Researchers face huge barriers as they attempt to publish studies based on discourse analysis. The method is highly labour intensive and time consuming". They add, "...there are strong reasons, which increase the importance of discourse analysis in the IS field. In our view, those reasons have overshadowed disadvantages and pushed us to dive into this method. We view discourse analysis as a useful methodology for studying information systems"

The above arguments suggest that CDA would benefit from GST and *vice versa*. To this end, I will propose a CDA-GST framework. In the next section, the framework is described.

### **3.5.2 CDA-GST Framework**

Giddens' Structuration theory is used as a grand theory in as far as it conceptualizes the relations between social structure and social action. Giddens' postulation of the duality of structure means that Structuration theory is both a theory and a method to the extent that it allows us to have a dual philosophical perspective of both a micro- and macro

sociological view. The relationship between Structuration theory and CDA is implied by Meyer (2001):

*General social theories, often called 'grand theories', try to conceptualize relations between social structure and social action and thus link micro- and macro-sociological phenomena. Within this level one can distinguish between the more Structuralist and the more individualist approaches. To put it very simply, the former provide top-down explanations (structure -> action), whereas the latter prefer bottom-up explanations (action-> structure). Many modern theories try to reconcile these positions and imply some kind of circularity between social action and social structure (p. 19).*

Figure 2.2 showed the three dimensions of CDA: text, interaction and social action. In Figure 2.7 the duality of structure (interaction, modality and structure) was depicted. In this section, I discuss how these two Figures (2.2 and 2.7) are merged into Figure 3.5 below.

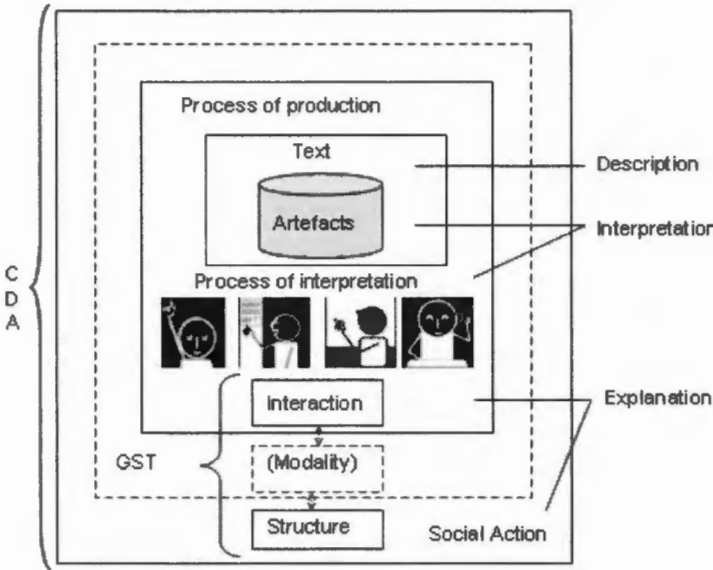


Figure 3.5: CDA-GST Framework Overview

Both CDA and GST refer to human *interaction*. In merging the two theories, I have used interaction as a link between them. CDA is explicit about the outcome of interaction. It refers to text as an outcome of production and interpretation. Text is not CDA's distinctive feature. Fairclough and Wodak (1997) point out: "what is distinctive about CDA is both that it intervenes on the side of dominated and oppressed groups and against dominating groups, and that it openly declares the emancipatory interests that

motivate it” (p. 259). The significance of this view of CDA in the context of this research is that information givers may tend to dominate information seekers. In other words, information seekers could become intellectually oppressed and allow information givers to dominate an information sharing activity. I will address the problem of possible dominance using anonymous communication.

The interaction process of CDA produces text. In this study, the interaction of information seekers and givers produces questions and responses. In Figure 3.6 I show that questions and responses are language expressions embodied with intentions. They are not only products of interactivity and sociality but produce interactivity and sociality.

In CDA, the relationship between *text*, *interaction* and *social action* is achieved through description, interpretation and explanation, respectively. In the CDA-GST framework, I recast the CDA *text* and give effect to the components of description, interpretation and explanation theoretical lenses (see Figure 3.6).

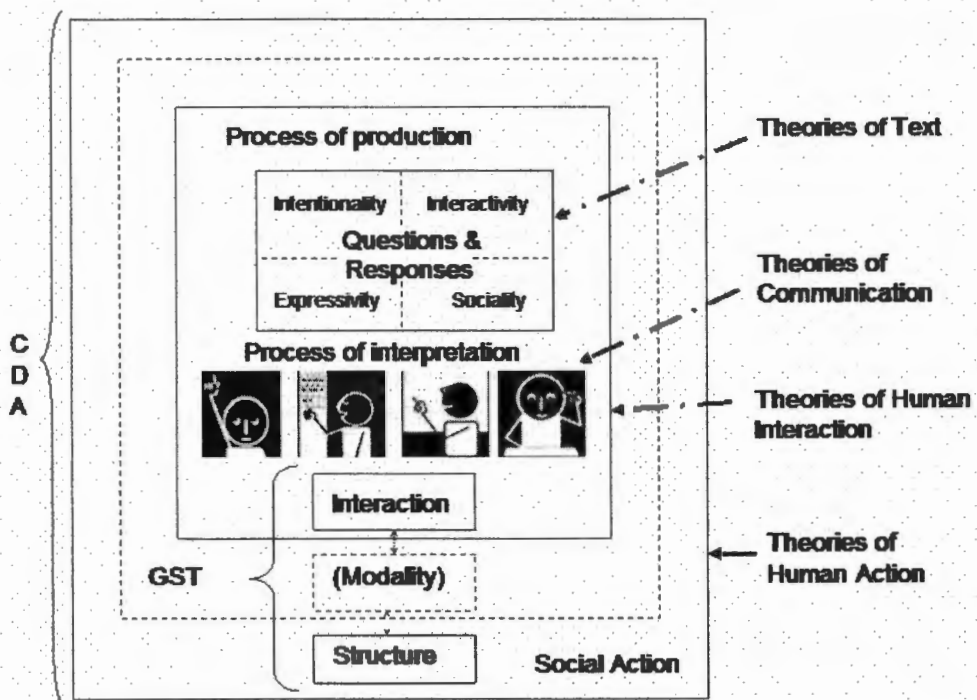


Figure 3.6: CDA-GST theoretical lenses

In Figure 3.7, I give clarity to the relationship between the three dimensions of CDA and the underpinning theories.

	Text (Questions & Responses)	Interaction	Social Action
Description	Theories of Text		
Interpretation	Computer-Mediated-Communication	Theories of Communication Theories of Human Interaction	
Explanation			Theories of Human Action

Figure 3.7: Overview of CDA-GST theories

In Chapter 2, I discussed the various theories in relation to text, interaction and human action. In Figure 3.7, I draw the relationship between the theories and the CDA components of *description*, *interpretation* and *explanation*. This is not to be confused with *description* of theories of text, or *interpretation* of theories of communication, etc. The use of theories will add richness to understanding text, interaction and social action. Figure 3.8 relates the theories to empirical materials. In Figure 3.8, I relate the different theories to the objects of analysis.

Theoretical Perspective	Empirical Materials	Analytical ‘lenses’
Theories of Text	DFAQ artefacts / digital genres	Speech Acts Knowledge Semantic Networks
Theories of Communication	Process of production and interpretation of text/messages	Interpreting communicated messages using genres /CDA
Theories of Human Interaction	Experience of actors / transcripts of interviews	Analysis of transcripts using CDA
Theories of Human Action	Experience of actors / transcripts of interviews	Analysis of transcripts using Giddens’ Duality of Structure

Figure 3.8: Relating theories to objects of analysis

In the next chapter, I will discuss the process of gathering empirical materials.



## **3.6 Concluding remarks**

In Chapters 1 and 2, I drew connections between the research problem and theoretical underpinnings. In this chapter, I have drawn connections between theoretical underpinnings, research approach and analytical framework. I have discussed the four dimensions of text (questions) namely: intentionality, interactivity, expressivity and sociality. I have discussed reasons for adopting an interpretive research paradigm. Finally, I have presented an analytical framework using CDA as an anchor to provide a discourse between theories. In the next chapter, I will discuss the process of gathering empirical materials.

## Chapter 4

## GATHERING EMPIRICAL MATERIALS

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## **4.1 Introduction**

In Chapter 3, I used the CDA-GST framework to draw connections between theoretical perspectives and the objects of study, *viz.*, text (DFAQ artefacts), interaction, and social action. The purpose of this chapter is two fold: first, it has a methodological focus in that I discuss how empirical materials were gathered. Second, it sets the stage for the next chapter, which will focus on the analysis of empirical materials. This chapter has four parts: a description of the case study (Section 4.2), DFAQ mediated interaction (Section 4.3), a description of DFAQ environment (Section 4.4), and a description of empirical materials (Section 4.5).

## **4.2 Description of Case Study**

### **4.2.1 Background**

The study investigated informal knowledge sharing among students at the University of Cape Town in South Africa. The University of Cape Town strives to be an outstanding teaching and research University, educating for life and addressing the challenges facing our society. One of the University's mission statements is "critical enquiry in the form of the search for new knowledge and better understanding". The term "search for" seems to suggest that knowledge is searchable and findable. I do not use the word knowledge in this sense. In Chapter 1, I mentioned that knowledge was an outcome of human activity. In other words, knowledge is constructed and de-constructed during human activity.

This particular mission is important to this research for two reasons: firstly, critical enquiry is a process of continuous questioning; secondly, the search for new knowledge suggests finding answers to questions. In view of this argument, it should be clear that the University's realization of this mission requires that we address the need for questioning skills among scholars.

I would like to take a broader view of questioning skills. My sense of a broader context focuses on the effects of the legacy of apartheid within which the University strives for

*critical enquiry.* The University is mindful of the legacy, as another mission statement reads, “strive to transcend the legacy of apartheid in South Africa and to overcome all forms of gender and other oppressive discrimination”. Although this statement appears to refer to the University’s quest to strive to overcome gender and other *visible* oppressive discrimination, I am not concerned with the *visible* oppressive discrimination but rather the unobservable mental states. In Ng’ambi (2003), I report comments of a lecturer at the University of Cape Town,

*Most of the women in my class who are from disadvantaged backgrounds will not ask questions in class. They won’t put themselves out on the line to be ridiculed by the class. Although the class does not actually ridicule you if you ask a question, they won’t do it (p. 296).*

I infer from Ng’ambi (*loc. cit.*) that asking a question is socio-historical related and that the fear of ridicule is merely a symptom. Students such as those women referred to in the statement do consult informally with one another. However, consultations are limited to clusters of friends and not necessarily knowledgeable peers. I want to state that Ng’ambi (*loc. cit.*) is not suggesting that the problem about the failure to ask questions in class is feministic, but could also involve factors such as histories of students. I have noted that the “histories of people and their social settings including language of instruction may be impacting on what and how people learn” (Ng’ambi, 2002b: 483).

Anecdotal evidence shows that students do not always use the language of instruction when communicating with one another. For example, students may draw examples from their cultural context to explain a concept to one another. Helping one another is students’ *modus vivendi*. From the educator’s point of view, it is difficult to know what students consult one another about, what information they share and on what topic they collaborate. My thesis is that the DFAQ enhances what students already do (consulting one another) and allows educators to gain insight into what students know (information they share).

The creation of a shared knowledge resource by students for students would benefit students by extending a one-to-one consultation to a one-to-many for the benefit of students absent from a consultation session. A *one-to-one* is cluster-based consultation while a *one-to-many* refers to extended access to information shared in a cluster to other clusters.

Two cohorts of students participated in this study. I investigated students in 2002 and 2003 who were registered for an honours course at the University of Cape Town. My study of 2002 was a pilot study and DFAQ had yet to be fully developed. In 2002, students interrogated the text using Microsoft Word (see Figure 4.1).

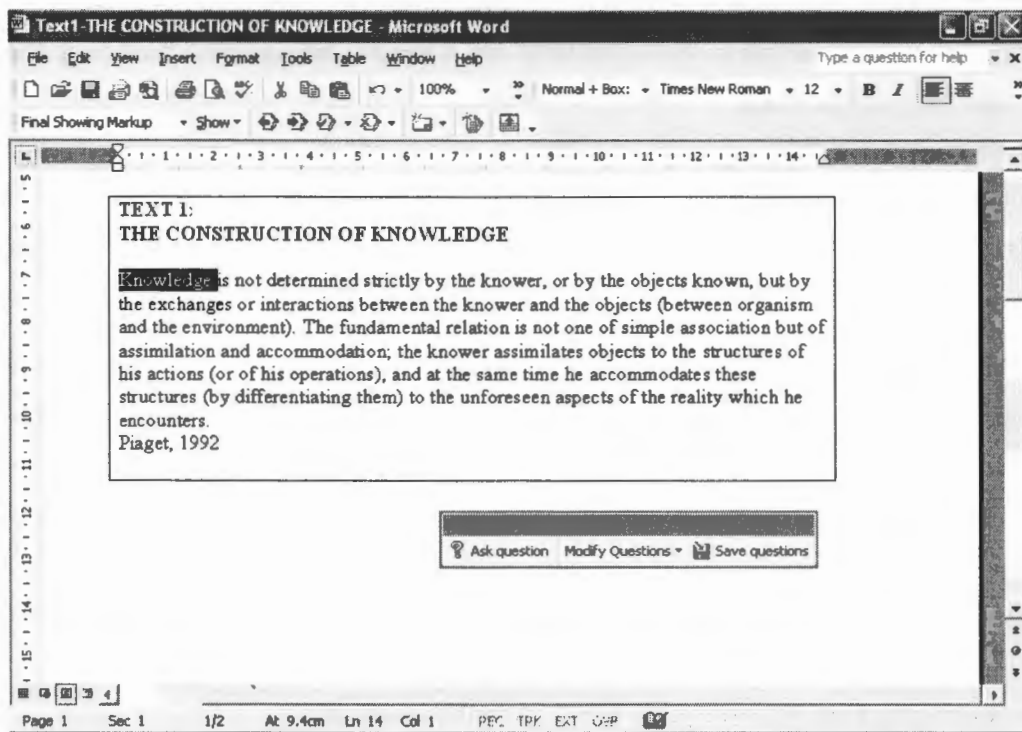


Figure 4.1: Text with an interrogative toolbar  
(Source: Hardman and Ng'ambi, 2003: 141)

Although the questioning of text was computer mediated, there was no mediated interaction for students. The objective of the pilot study was computer-mediated engagement with academic text. To this end, empirical materials from 2002 are not included in the analysis here unless stated otherwise.

In both cases (2002 and 2003), students were in-service teachers from resource-impoveryished schools located in black townships. The students were non-English speaking and not resident on campus. They travelled to campus only when they had a lecture or an appointment with a lecturer. There was insufficient time to consult with others or the lecturer while on campus. Although, they had no formal undergraduate degrees, admission to the honours course was due to work experience. They were all educators with an average age of thirty-five. They shared the following other

characteristics: struggled to understand academic materials (academic discourse); brought to the course different experiences, skills and knowledge; and uncomfortable to expose their ignorance in a face-to-face session.

### 4.2.2 Context

The background of the research is that, “it arose as a response to academic underachievement by students. Anecdotal evidence indicates that some of these learners are unable to read actively. In other words, learners appear unable to appreciate their role as active cognizing agents in constructing meaning from text” (Hardman and Ng’ambi, 2003: 139). This problem is particularly serious within a University where students have to deal with academic readings for which critical questioning skills are essential. For most of these learners, prior schooling did not prepare them for the critical demand of University academic texts. Consequently, as Hardman and I (*ibid.*) contend “...learners approach University ill-structured problems in the same way as they would approach puzzle-like problems, as problems that have a single, knowable answer, which once found, can close further enquiry”

When given a task, learners tended to cluster themselves in either pairs or small groups of friends to source from each other and exchange “knowledge”. Consultations were limited within clusters of friends and not based on asking knowledgeable peers. Students would often prefer consulting peers rather than consulting a subject expert or tutor. There are three problems identified in this consultation phenomenon: a) consultation was limited to clusters of friends and not necessarily to knowledgeable peers; b) there was no way a subject expert would know what “knowledge” exchanged among students; c) consultation does not involve experts but students helping one another.

The significance of the student context of information sharing is that students are not experts but share their understanding with one another. When a student asks a question, they are engaging in an information seeking activity. Information seeking involves communicative interaction as Benoit (2001) notes:

*Information seeking consists of an information-seeking event (the overarching proposition) that exists as a cultural phenomenon, performed by experts interacting with non-experts (information seekers). The uncritical assumptions that both parties (expert and seeker) bring to individual*

*information seeking events influence language use and interpretive behaviour. If we study how expert-seeker discourse actually unfolds during information seeking 'events', it is possible to discover which behaviours hinder and which help meaning construction.*

Benoit gives a way of thinking about questions as a language of information seekers used for communication with experts. My argument is that to view questions as a language of communication between non-experts and experts allows experts to focus on the answers / response with little regard to the questions underlying knowledge. Although responses to questions are important, responses address the ostensive aspect of questions and not the reasons that underlie a question. For this reason, whenever I refer to DFAQ artefacts I mean *questions posted in DFAQ*, unless I have explicitly indicated otherwise.

I have recast peer consultation as involving changing roles of expert and non-expert between seekers and givers of information. In other words, a student is both an information seeker and an information giver hence is both non-expert and an expert. Peers oscillate between expert (helping someone else) and non-expert (seeking help themselves). Conceptualization creates an environment in which peers are motivated to share what they know and learn from others what they do not know.

I will now describe how the DFAQ was used and use Van Dijk's (1996) patterns of access which are "planning, setting, controlling of communicative events, and scope and audience control" (p. 87) to guide the discussion.

### **4.2.3 Planning**

Planning a communicative event involves making decisions about the meeting time, venue, agenda, etc., and inviting participants to attend. A communicative event can also occur when a subject takes the initiative rather than wait for an invitation. Van Dijk (1996) gives two examples: a patient taking an initiative to talk to a doctor, and a student asking to talk to a professor. In either case, the doctor or the professor would usually decide about the setting. I differ with Van Dijk's conceptualisation of initiation of communicative event in three ways. Firstly, in Van Dijk's thesis, powerful actors have the authority to decide on the setting of a communicative event. Mere consciousness of these powerful actors constrains interactions as it takes the focus away from the content of communication to the source of content. Secondly, I am concerned about informal communication among peers for example: a doctor consulting with doctors, or a professor with other professors. In the

context of this study, students consult with students. Finally, I am concerned with recursive social life in which a patient consults with a doctor, where the patient is also a doctor; a student consults an “expert”, where a student is also an “expert”. Such communication events do not need planning and they are socially located.

#### 4.2.4 Setting

Setting of a communicative event involves deciding on who controls the interaction. As Van Dijk (1996) put it, “who is allowed or obliged to participate, and in what role, may be decided by the chairperson or by other powerful participants who control the interaction” (p. 87). Van Dijk gives an example of the effect of positioning and the presence of props of power such as the robes of a judge and the uniform of a police officer. My addition to Van Dijk’s rationalisation is that positioning and power are often unspoken or unwritten. Human actions are a product of consciousness of these unspoken or unwritten conditions. Mindful of the power and effect of powerful actors in a communication event, DFAQ anonymity enables rather than inhibit interactivity.

#### 4.2.5 Controlling communicative events

I do not like the way Van Dijk uses the word *control* of communicative events, as the word comes with a lot of baggage and I will instead use the word “regulate”. The power to regulate communicative events, as Van Dijk (1996) observes,

*consists of various dimensions of speech and talk; which mode of communication may/must be used; which language may/must be used by whom; which genres of discourse are allowed; which types of speech acts; or who may begin or interrupt turns at talk or discursive sequences* (p. 88).

Van Dijk gives an example of defendants in court who may be required to speak the standard language, to answer questions only (and only when required to speak), to speak only about the topic being discussed, and using a polite, deferential style.

To the extent that Information Systems receive certain input, in particular format and produce certain output depending on its architectural design, systems have regulated communicative events. As a prelude to describing the communication artefacts or genre of DFAQ, I start by stating that DFAQ is a communication medium used to capture



communication genre. Paivarinta (2001) stresses, “a communication genre should be distinguished from the medium of communication; for instance, a fax or e-mail are not good examples of communication genres, whereas a hotel reservation or an invitation to a meeting, which can be mediated by fax or electronic mail, are” (p. 213). When someone mentions the word e-mail, they may be referring to e-mail as a medium of communication or e-mail as a message. It is because of this ambiguity that Paivarinta (*loc. cit.*) argues that e-mail was not a good example of communication genre. DFAQ may suffer from the same ambiguity of reference. The mention of DFAQ could refer to a web-based consultation medium or to the dynamically created digital genre. It follows that dynamic digital genres are a collection of speech or written communication.

The genres of discourse allowed in the DFAQ are questions and responses. Any user may post a question on any aspect of the reading materials presented to them in class and anyone may respond to the question posted. There is no limit to the number of responses to a question. The goal was to support critical reading of academic materials, widening access to knowledgeable peers, creating a knowledge resource for students, and as a diagnostic resource for teaching staff.

#### **4.2.6 Scope and audience access**

Scope is used ambiguously to mean the size of an audience and quality of knowledgeable peers. The view of size of audience is in terms of the limitation of physical clusters. In a physical cluster, the size is limited to the number of friends a student has. In the context of this section, the size of audience is boundless. This means that every individual student has access to all students. As Van Dijk (1996) observes, “...when speakers are able to influence the mental models, knowledge, attitudes and eventually the ideologies of recipients, they may indirectly control their future actions” (p. 89).

The influence on a students' mental model is in two ways: a) exposure to other students' questions and responses b) interpreting a response to a posted question. Access to a deluge of questions from other students mirrors understanding of a class to an individual and hence indirectly affecting their questioning behaviour. For example, a student may either his/her question answered or new questions may arise.

### 4.2.7 Dialogue

Dialogue is a meaning construction activity. To accept this view, is to accept that dialogue can occur between meaning-making agents or a meaning-making agent with text, or with self (reflecting and questioning ones own actions). In other words, a human agent is engaged in dialogue when he/she questions and interrogates text or “thoughts”, even without another human agent being involved. Rhodes (2000) observes, “...dialogue is a process where people mobilize language by talking, listening and constructing meaning on the basis of their interaction with others” (p. 217). The term ‘mobilize’ suggests that an appropriate language is organized for a particular purpose. I am particularly interested in how students use language (questions) to acquire and use knowledge. Evard (1996) points out that,

*When asking a question, a child needs to articulate what he or she wants to learn or obtain. If a child does not need a response, then a child has the opportunity to observe a different perspective on the question. The child may also realize that a single statement of a question may provoke different reactions in different people. Similarly, answering a question requires articulation of thoughts; in addition, it implies some interpretation of the question and what kind of answer was desired (p. 224).*

My argument is that analyzing consultation dialogue and the experience of human actors would contribute to understanding the phenomenon of student informal knowledge sharing. Rhodes (2000) notes that “while research into organizational learning has focused on dialogue as a process of communication and inquiry that leads to shared knowledge, little attention has been placed on dialogue as a way on understanding knowledge in terms of social and power relationships in organizations” (p. 218).

## 4.3 DFAQ Mediated Interaction

In Section 4.2.3 above, I distinguished between DFAQ as a medium of consultation, and DFAQ as a digital genre. In this section, I will discuss DFAQ mediated interaction. DFAQ mediated interaction is a three dimensional space consisting of an educative space; communicative space; and a social space. I will now briefly describe the three spaces.

### 4.3.1 DFAQ Educative Space

To adopt an educative perspective of DFAQ is to see it as a learning tool. I use the term *learning* ambiguously to include learning about the thinking of other people through reading their postings. The objective of an educative space is two fold: a) to facilitate individual learning through need driven consultation and *community* driven support; b) to provide decision makers with a *window* through which to see users' knowledge levels or intervention opportunities. The purpose of the DFAQ is to "provide a space in which users consult one another, and the resulting artefacts become a learning resource for users. Users of the DFAQ post questions; respond to questions or engage in question based chat rooms" (Ng'ambi, 2003: 295).

### 4.3.2 DFAQ Communicative Space

To hold a communicative perspective of DFAQ is to see it as a vehicle through which messages from a sender can reach an audience of readers. The purpose of the communicative space is to allow users with questions access to *knowledgeable* users who are otherwise inaccessible. Information seekers do not ask questions *ex nihilo nihil fit* but questions arise from prior knowledge. It follows that no interpretation of questions can proceed without knowledge. Given that DFAQ communication involves sending, receiving and interpreting of messages, it is a knowledge sharing space.

### 4.3.3 DFAQ Social Space

A social view suggests that DFAQ is a meeting place of a community with a shared goal. In a social space, users are either in a *speaking* or in a *listening* mode. Listening may include 'mingling' in the environment without being *actively* involved in the act of asking or responding to a question. I must state here that 'mingling' in the DFAQ space does not suggest closure of inquiry but rather that a question may arise from the mingling experience.

## 4.4 Description of DFAQ environment

### 4.4.1 Impact of three-dimensional space on DFAQ design

The three dimensional space requirements of the DFAQ had implications on how the design and user interface were conceptualised. In this section, I will first describe the architecture of the DFAQ and then discuss the implications of the three-dimensional space requirement on the user interface design.

#### 4.4.1.1 High Level Overview of DFAQ

The DFAQ has two parts: a user interface (web browser side) and an intelligent handler (web server side). The intelligent handler provides an interface to the database backend. The database holds a repository of artefacts. The artefact repository maintains three banks: a question, response and experience bank (see Figure 4.2). Three processes access these banks: a Question Search, Question & Response Handler, and a Question & Response Ranker.

In (Ng'ambi, 2002d:211) I describe the architecture as consisting of:

*Intelligent Question and Response Handler* – this creates and maintains question and response pools. It has three specialized functions:

*Question Search* – used to search and retrieve questions, and provide entry into question-based chat rooms (sense making rooms). The results of a question search are interactive questions and responses, which allows a user either to respond to a question or to comment on a given response. The “respond to question” process involves an internal process (transparent to other users) of interpretation and meaning making from questions. In addition to responding to a question, users may choose to rate responses. The objective of a response rating is to build a collective or consensus rating for the purposes of providing insight into the synthetic judgments based on interpretation of responses.

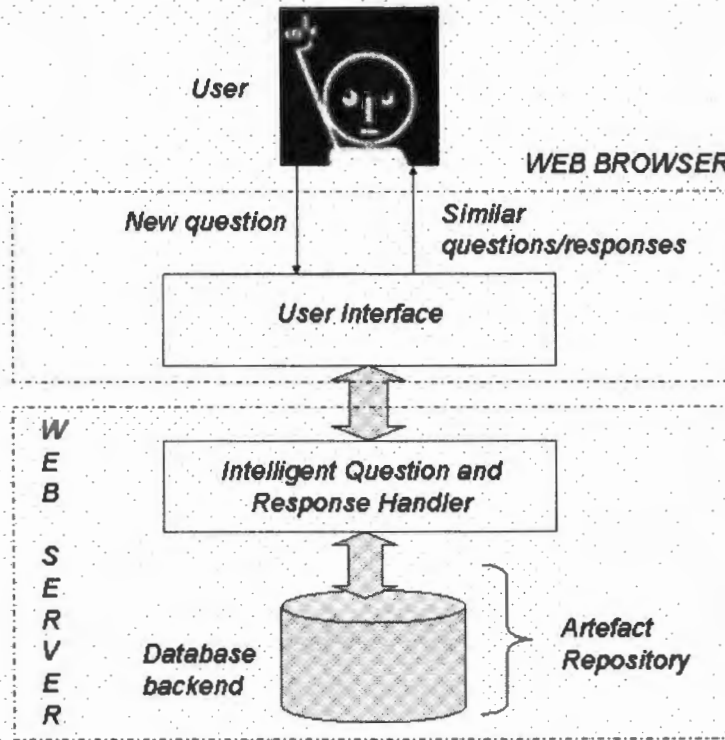


Figure 4.2: DFAQ high-level view

*Q&R Handler* – uses questions ‘found’ by the search to retrieve appropriate responses if any, otherwise notifies the user with closely related questions with responses. The handler keeps track of questions that a user chooses from a list of proposed alternative questions.

*Q&R Ranker* – maintains three types of lists: the most recently referenced questions (question age ranking), questions with the greatest likelihood (popularity by frequency) of being referenced and the FAQ pareto analysis (80:20 rule). “Majority of questions (80%) are based on a few key causes (20%)”. By responding to 20% of causes 80% of questions can be answered” (Ng’ambi, 2002d). The purpose of the Ranker is to maintain three lists dynamically *viz.* a frequently asked questions (FAQ) list, a frequently referenced questions (FRQ) list and a recently asked questions (RAQ) list.

Figure 4.3 depicts a designer’s view of DFAQ user activities. The processes of adding a new question, responding to question, searching for questions, viewing and rating responses are illustrated.

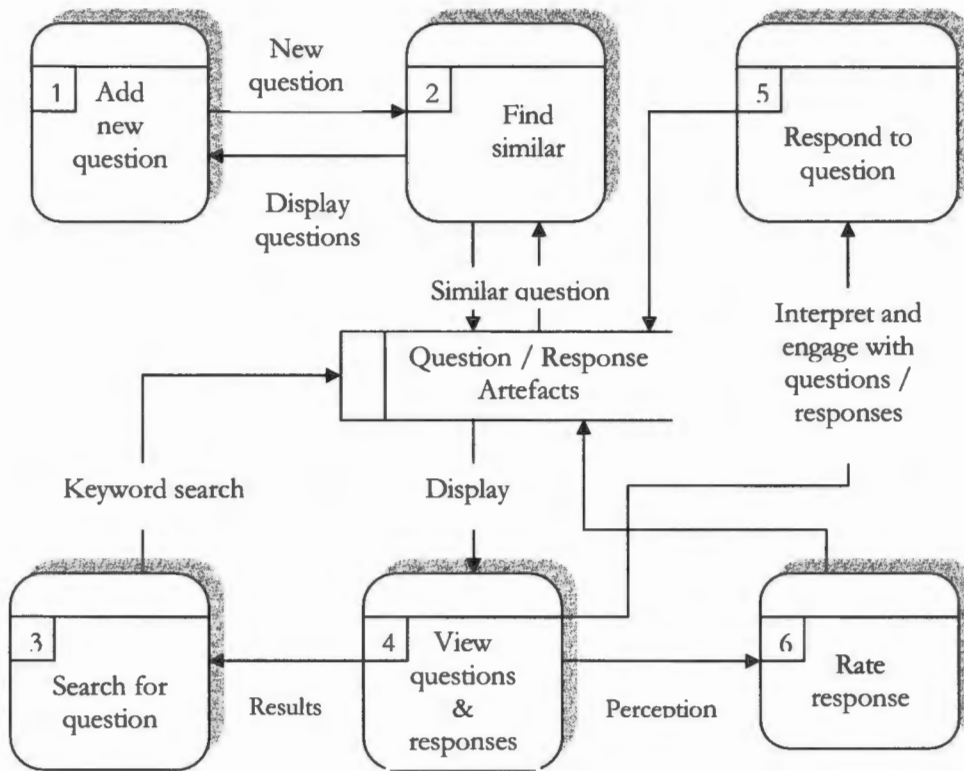


Figure 4.3: Designer's view of DFAQ user activities

The user activities within the DFAQ environment involve the following:

- 1 Adding new Question
- 2 Finding Similar Questions
- 3 Searching for Questions
- 4 Viewing Questions and Responses
- 5 Responding to Questions
- 6 Rating Responses

I will comment in particular on the relationship between [4] and [5]. In [4] a user *views questions and responses*, may choose to add new responses or rate existing responses. These questions and responses are postings made by other anonymous users. The user *interprets and engages with the questions and responses* before *responding to question* [5]. This is significant

because the user is interacting with other contributions (postings from other students). One problem of static FAQ lists is that they tend to suggest that questions, responses are closed and non-negotiable (Ng'ambi, 2002d).

#### **4.4.1.2 User Interface Design Considerations**

The user interface is accessible via a web browser. I made the following design assumptions:

- i) Most users were already familiar with a web browser interface due to the pervasive nature of the Internet. The embedding of the DFAQ within a web browser reduces the learning curve of users and makes the DFAQ easily accessible to Internet users.
- ii) In organizations where some web presence already exists, the browser provides easy integrations to already familiar web spaces for users. In such cases, the DFAQ becomes an add-on tool with little or no modifications required other than the set up process.
- iii) Users of the DFAQ are engaged in an authentic knowledge sharing activity or task for which consultation with peers is inevitable. The objective of DFAQ is to facilitate informal knowledge sharing and that artefacts are an outcome of a consultative experience.
- iv) Both questions and responses are text messages. The use of text makes it possible for consultations to leave traces or an audit trail of messages. I will later give more details about these artefacts.

I was mindful of the fact that questions were observable but not the thinking behind questions. This view is important for two reasons. First, while students assisted each other by answering each other's questions, I wanted to use this shared knowledge to gain understanding not only into what students knew but also into the nature of misunderstandings or misconceptions of knowledge among students. Second, I wanted to analyse the artefacts with the view of gaining insight into issues of signification, domination and legitimation, which manifest through peer-to-peer interaction.

## 4.5 Description of Empirical Materials

In Chapter 1 (see Section 1.7), I pointed out that there are three implementation phases of this research. The first phase involved the introduction of DFAQ into the real world. In the second phase, DFAQ artefacts are analysed and in the final phase, DFAQ is re-designed using the results from Phase 2. I also mentioned that the re-design (Phase 3) of the DFAQ is outside the scope of this thesis. In this section, I briefly describe Phase 1, the introduction of DFAQ into the real world. The rest of the thesis will focus on Phase 2.

### 4.5.1 The DFAQ “real-world” context

In section 4.2.1 above, I mentioned that the student participants were all in-service teachers from resource-impovertised schools located in black townships. There are three distinctive characteristics of the students: they all a) worked full-time and studied part-time, b) did not know one another, and c) found academic discourse (readings) a challenge.

The nature of the course demanded critical reading of materials. The students were not resident on campus, and only came to campus to attend lectures meant that they had no social interaction with fellow students. As I have observed (Ng’ambi, 2000a) “inflexible time-bound courses run in a fixed academic calendar, with no freedom for the learner to negotiate content or the medium of instruction”, (p. 484) are increasingly becoming unsuitable for students, especially postgraduate students who have to work to pay for their education. For these students, the DFAQ was a medium of communication with other students, a social space for interaction and an educative space to learn.

Figure 4.4 depicts the relationship between the course and the role of DFAQ in supporting the learning objectives. Student A, for instance, interacts with resources (academic materials or learning activities) and decides to ask student D for help. Student D helps A. Student C has a problem for which student B can provide a solution but instead asks D for help. There are three problems here: a) student B who could have been of help was not accessible; b) we have no record of student A’s question and student C’s problem; c) we have no way of knowing what student D gave as help and regardless of how helpful student D was, the actual help is lost. As I have noted, “*although the three problems are said to*



*be problems, I saw them as opportunities for creating spaces in which users gave support to one another'* (Ng'ambi, 2003:293).

The “lost consultation” phenomenon is not restricted to student’s informal knowledge sharing. My experience as an educator has been that a student asks an extremely useful question during a face-to-face consultation in my office and both the question and the response would not be available to the rest of the class. The consultation is therefore lost. Another example is when many students consult with an educator at different times but with a similar question. The educator may answer the same question many times.

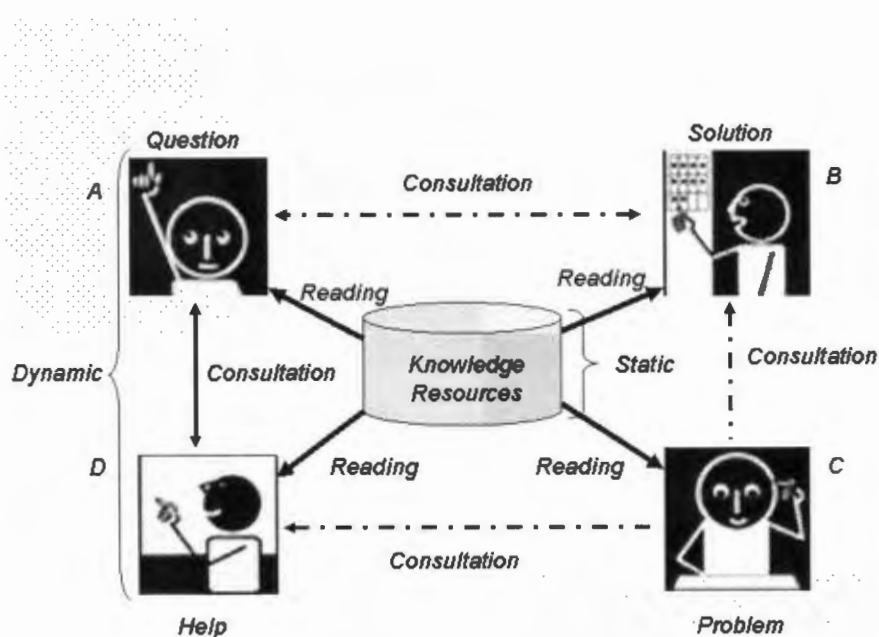


Figure 4.4: Lost consultations (Source: Ng'ambi, 2003)

In the context of this study, the static knowledge resources were academic readings. Although the study did not guarantee that there was no “lost consultation”, the approach was to allow consultations through the DFAQ. In (Ng'ambi, 2003) I have argued that

*...users interacting with static knowledge resources (materials users cannot update but can only read) tend to find other means of consulting with knowledgeable friends but both the queries and outcomes of such consultations do not persist beyond a consultation time. The problem with this temporality of consultation instances is that valuable knowledge that is exchanged during consultation sessions is lost and users with questions / problems continue being deprived access to*

*knowledgeable peers because they have no way of knowing which user knows the answer to specific problems (p. 293).*

Anecdotal evidence suggests that students who suffer from low self-esteem often fail to ask questions in a face-to-face session but rather chat with close friends outside class. While this type of information seeking helps students to support each other, these consultations are limited to close associates or friends and the exchanged information is not available to the rest of the class.

In this study, the extracts (Figure 4.5 and Figure 4.6) constituted part of the students' academic readings.

**EXTRACT 1:  
THE CONSTRUCTION OF KNOWLEDGE**

*Knowledge is not determined strictly by the knower, or by the objects known, but by the exchanges or interactions between the knower and the objects (between organism and the environment). The fundamental relation is not one of simple association but of assimilation and accommodation; the knower assimilates objects to the structures of his actions (or of his operations), and at the same time he accommodates these structures (by differentiating them) to the unforeseen aspects of the reality which he encounters. (Piaget, 1992: 140-141)*

Figure 4.5: Extract 1 - Construction of Knowledge

**EXTRACT 2:  
EQUILIBRATION**

*The study of regulation has shown us how equilibration is achieved in its three forms: between the subject and the objects, between the schemes or sub schemes on the same hierarchic level, and between their differentiations and their integrations into superior totalities. We must stress that cognitive equilibration never achieves a stopping point, even on a temporary basis, and that this situation is not to be regretted... The fact that states of equilibrium are always exceeded is the result, on the contrary, of a very positive force. Any knowledge raises new problems as it solves preceding ones. This is evident in the experimental sciences where the discovery of the causality of a phenomenon raises the question of the cause of the causality and so forth. ... By no means does an equilibrium constitute a stopping point, since any finished structure can always give rise to new requirements in fresh substructures or to integrations in greater structures (Piaget, 1977: 11-12)*

Figure 4.6: Extract 2- Equilibration

The reading materials were not for the purposes of this research but were an integral part of the course materials. The objective of the readings was to introduce Piaget's concepts of *equilibration, assimilation, and accommodation* to mention but three. Students used the

DFAQ consultation environment to ask one another questions and share their understanding of the texts. For the reasons already discussed in Section 4.2.1, the DFAQ environment was the students' medium of consultation.

Figure 4.5 illustrates how the DFAQ mediated consultation. Students did not need to target their questions to particular students, but would post questions anonymously. The significance of this approach is that in addition to the academic material (static knowledge resource), a new knowledge resource is being created based on consultation.

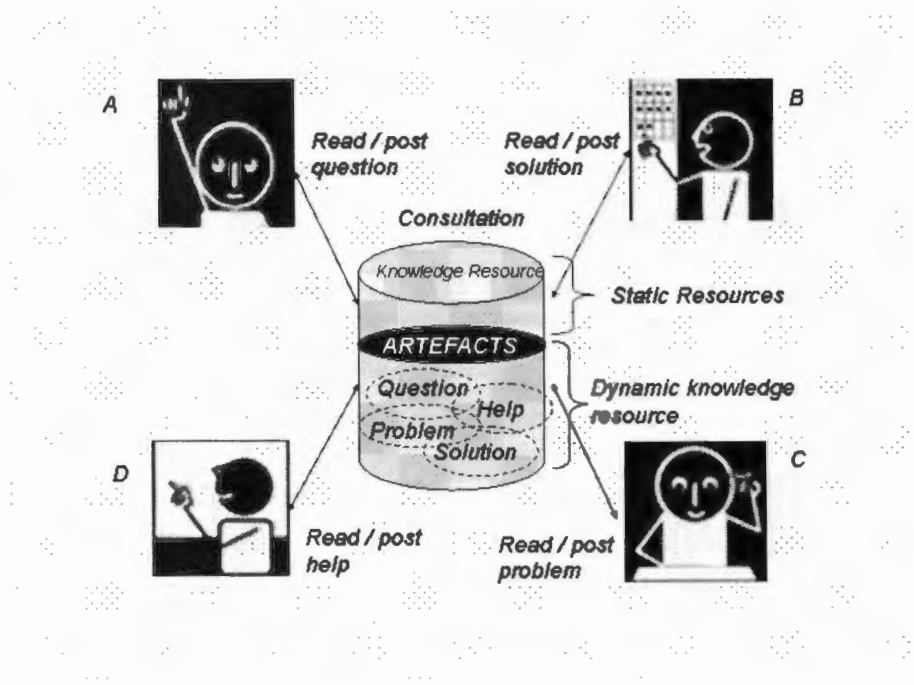


Figure 4.7: Dynamic Knowledge Resource of persistent artefacts (Source: Ng'ambi, 2003)

*Learning takes place at two levels: a) through the interrogation of knowledge resources; b) through the socialization (consultation of one another). In figure 4.5, consultation takes place through a communicative space, and consultations “persist” as artefacts. (Ng'ambi, 2003)*

Students used the DFAQ to informally ask questions, and receive help from one another. Artefacts of knowledge sharing “persisted” beyond consultation sessions. Figure 4.6 shows part of the DFAQ environment. The DFAQ is both a medium of communication / consultation and a dynamic knowledge resource.

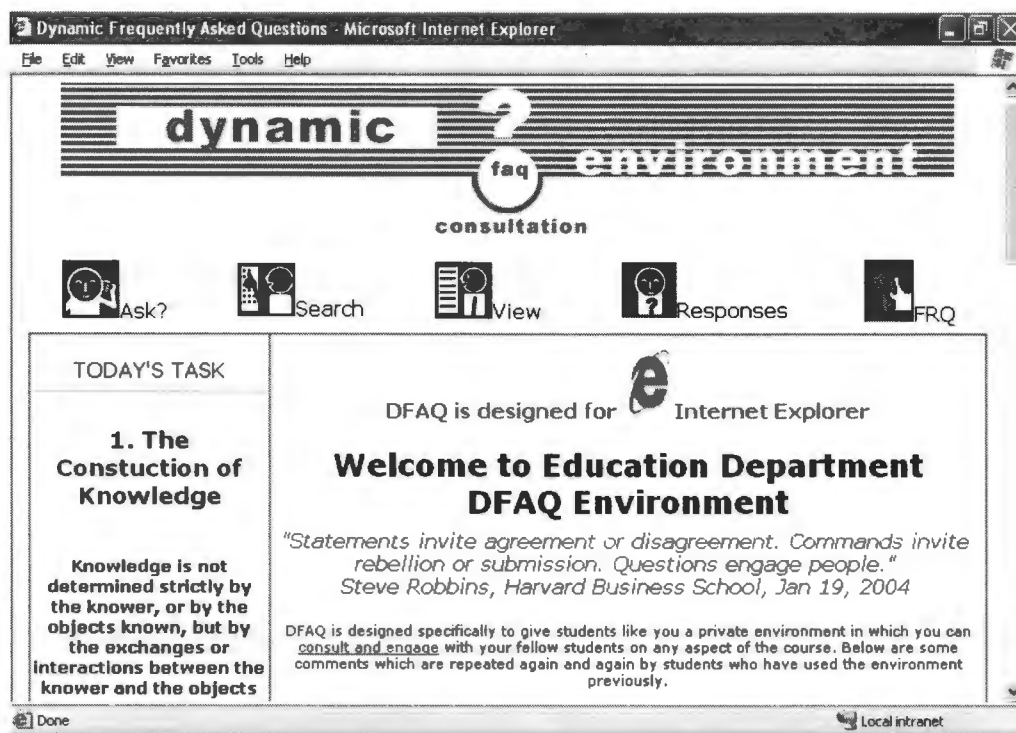


Figure 4.8: DFAQ welcome page

#### 4.5.2 Capturing DFAQ empirical materials

In the previous chapter (see Section 3.5), I outlined empirical materials. In this section, I will elaborate further on these materials. There are three types of empirical materials: DFAQ artefacts; interaction leading to the production and interpretation of text / messages; and the experience of students.

### 4.5.3 DFAQ artefacts

DFAQ is both an informal consultation medium as well as a dynamically created knowledge resource (see Chapter 1 - Section 1.6). In this section, I will focus on the latter. The dynamically created knowledge resource (artefacts) is an outcome of an anonymous asynchronous DFAQ communication. As an anonymous medium, DFAQ draws its users' attention away from the sources of messages to focus on the content. This was particularly important in this study because anecdotal evidence suggested that these students lacked interactive confidence. The asynchronous nature of DFAQ meant that students could access DFAQ in their own time and this provided the necessary flexibility to suit varying demands of working mature students.

At the start of the course, students had a hands-on practical session about the basic features of DFAQ. DFAQ has an intuitive user-friendly interface consisting of the following basic features: asking a question, responding to questions, searching, viewing, etc. Figure 4.9 shows part of the recently asked questions list.

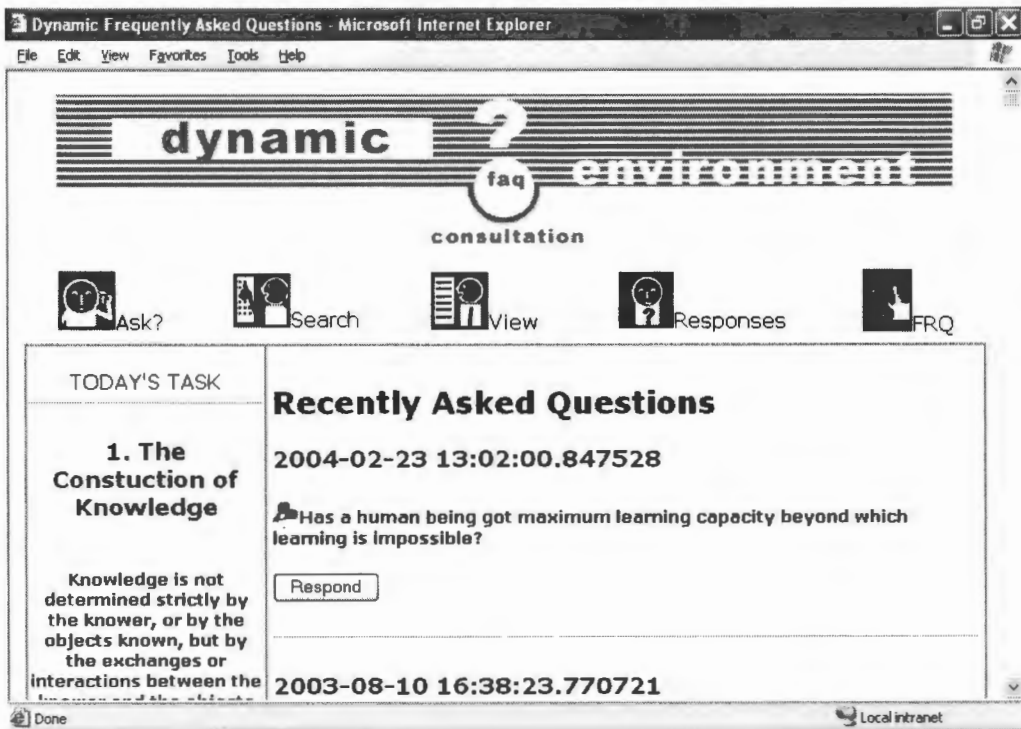


Figure 4.9: Recently Asked Questions List

As shown in Figure 4.9, questions only indicated the date and time of posting. The asynchronous nature of the DFAQ meant that students would reflect on the questions before responding.

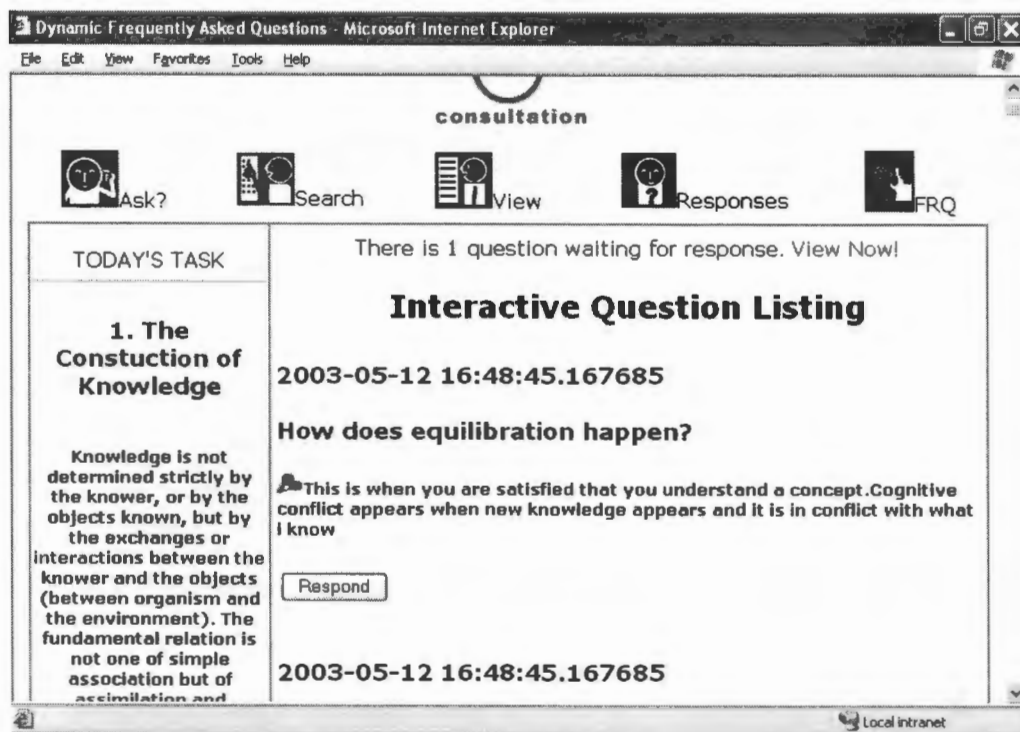


Figure 4.10: Waiting for Response

Figure 4.10 shows a question and a response. The *response button* after a response suggests that a response does not bring closure (it is not a final word) to a question. For example, figure 4.11 shows a question with more than one response. Also, note that there is one question waiting for response. This is particularly useful in that, although the queue is not a FIFO (first-in, first-out), questions rank according to waiting age. In other words, a recently posted question “sits” at the bottom of the queue.

In figure 4.11, I depict the fact that understanding precedes interpretation. Without understanding, a hearer will not construct knowledge. A hearer or reader of a question has responded by saying, *I do not understand this question*. This means that the hearer could not interpret and therefore understand the message. I wish to note that, like other questions, it is in English. One would therefore wonder why the question is not intelligible. The significance of this example is that embodied in text, is intentionality and expressivity. While questions invite responses, responses invite questions (see Figure 4.12).

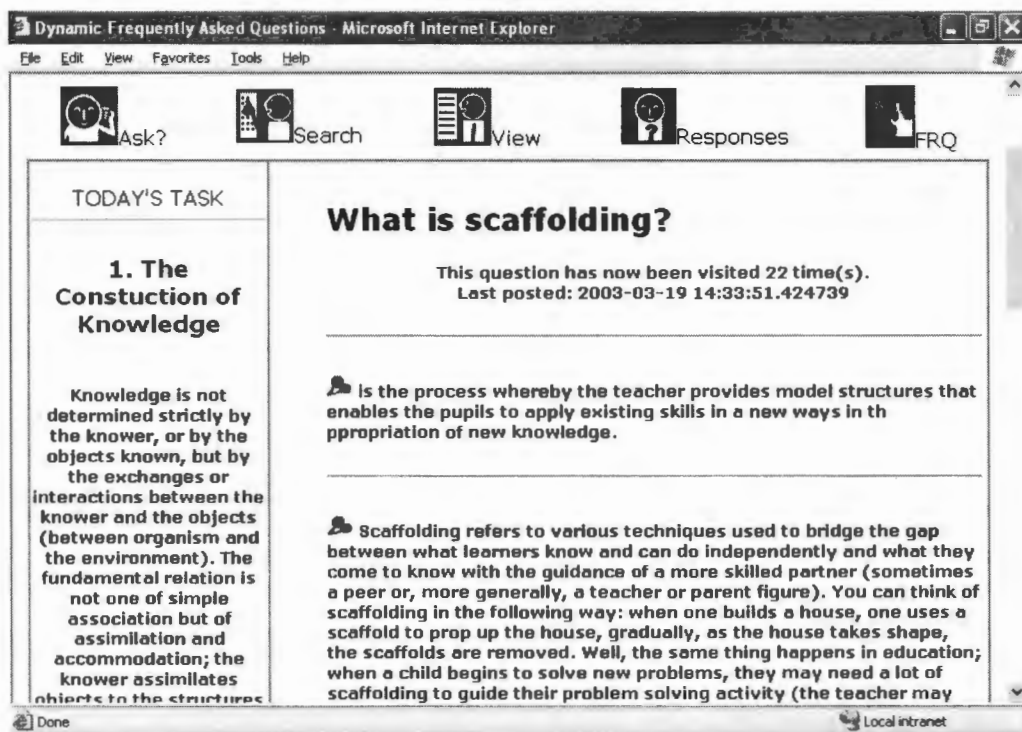


Figure 4.11: Multiple responses

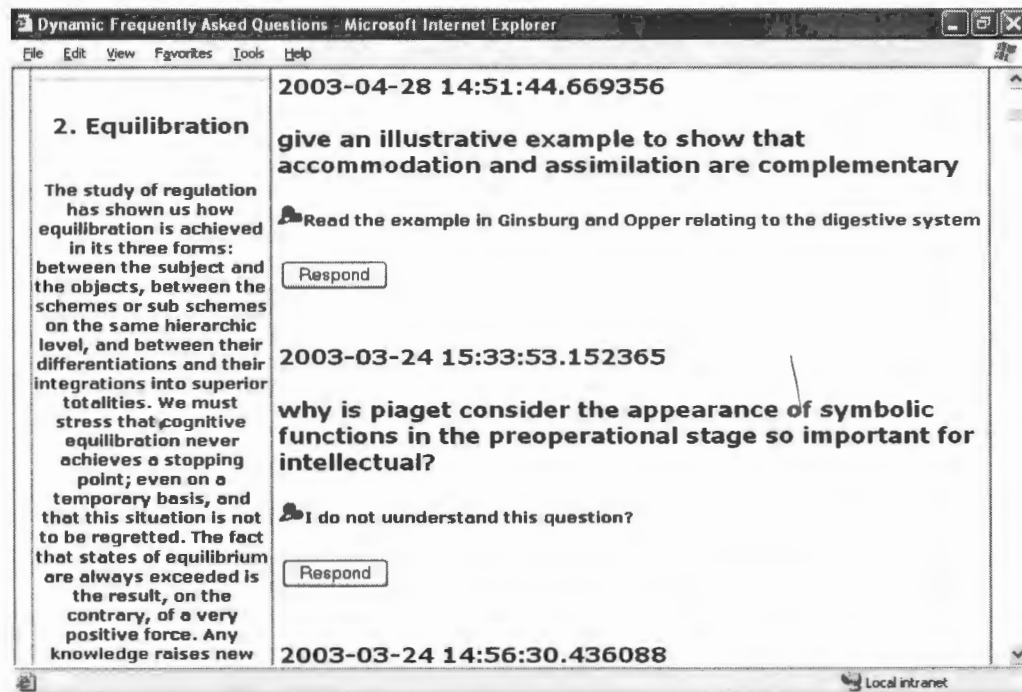


Figure 4.12: Dialogue with questions

#### **4.5.4 Focus Group Discussions**

At the end of the semester, I informed students of my intentions to have a focus group discussion on student experiences of the DFAQ mediated consultation environment. The purpose of the interview was to evaluate the DFAQ mediated anonymous consultation on students' sharing of knowledge. I reminded students that DFAQ was a research project and that the interviews are for research purposes. I assured students that the information shared during the interviews was in confidence, would not be used against them, and their identities would not be disclosed. Students volunteered to participate as interviewees and signed consent forms.

There were five students scheduled for a focus group discussion but only three attended the session. The apologies from the two students attributed their failure to attend to pressures at their work places. We held the group discussions in a computer laboratory, which was a familiar environment to post-graduate students. The timing of the interview was after hours as this was the only time suitable for working students.

Students were first briefly interviewed individually and then had a group discussion. The individual interviews served as both warm-up interviews and ~~were~~ useful for knowing about the individual participating in the focus group discussion. The other reason was to gain insight into the individual experience of knowledge sharing. I was mindful of the possibility of losing valuable stories of experiences in a group discussion. The aim was to establish both the socio-historical background of the participant and the impact of the social conditions and historical backgrounds on knowledge sharing in general and in particular on the production of questions, interpretation and responses to them. I will analyse the focus group discussion in Chapter 5.

#### **4.5.5 In-depth individual interview**

The focus group interview necessitated the need to have a follow-up interview with one of the focus group participants. It was obvious from the group discussion that some issues needed further investigation in a separate interview. At the end of the group discussion, one of the students remarked, "I still have more to say". An interview was scheduled a week later at a different venue. This will be analysed in Chapter 5.



## **4.6 Concluding remarks**

In this chapter, I have distinguished between a pilot study conducted in 2002 and the case study of 2003. I have discussed the concept of DFAQ mediated interaction and the DFAQ environment. In the final part of the chapter, I described the empirical materials. I will analyse the empirical materials in the next chapter.

## Chapter 5

## ANALYSIS AND DISCUSSION OF EMPIRICAL MATERIALS

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## 5.1 Introduction

In the previous chapter, I discussed how empirical materials were gathered. I described the case study, the DFAQ mediated questioning and the empirical materials. I described the three dimensional nature of DFAQ, viz., the educative, communicative and social environments. I distinguished between DFAQ as a consultative medium and DFAQ artefacts. In this chapter, I will use the CDA-GST framework described in Chapter 3 to analyse empirical materials described in Chapter 4. Figure 5.1 gives an overview of the empirical materials analysed in this chapter.

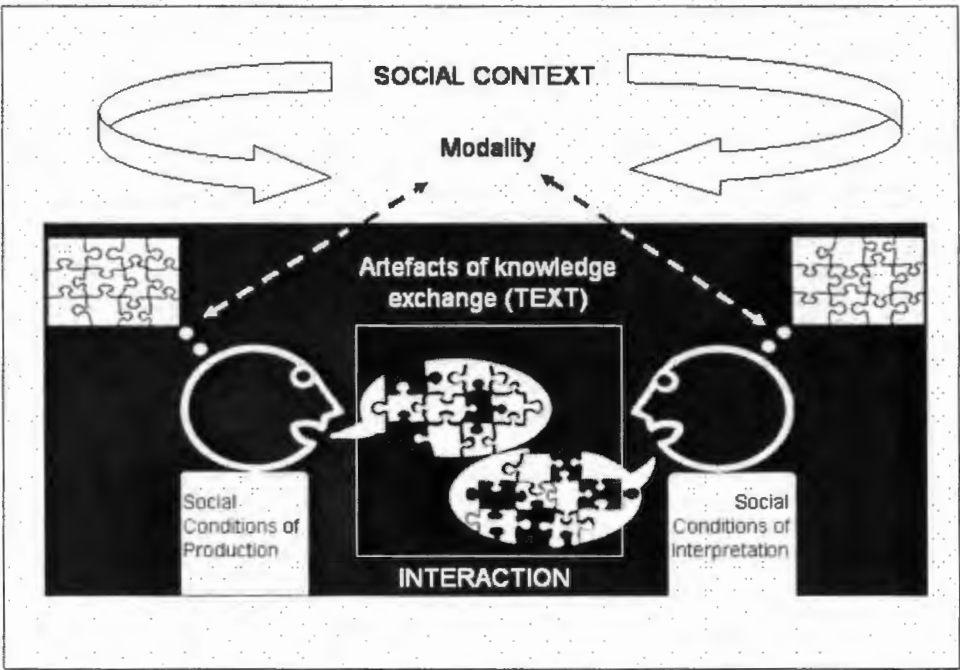


Figure 5.1: Overview of empirical materials

In the above figure, there are three objects of interest: interaction, artefacts of knowledge exchange (text) and the social context. Social conditions influence both the production and interpretation of messages as Giddens (1979) asserts “...all social actors, no matter how lowly, have some degree of penetration of the social forms which oppress them” (p. 72). In this study, the interaction is computer mediated and anonymous. Artefacts of knowledge exchange are an outcome of interaction. According to Fairclough (1992),

*...the relationship between social action and text is mediated by interaction. The nature of the interaction, how texts are produced and interpreted, depends upon the social action in which they are embedded; and the nature of the text, its formal and stylistic properties, on the one hand depends upon and constitutes 'traces' of its production, and on the other hand constitutes 'cues' of its interpretation (p. 11).*

I infer from Fairclough (*loc. cit.*) that DFAQ artefacts constitute *traces* and *cues* of its production (computer mediated informal knowledge sharing) and interpretation, respectively. The objective of this chapter is to use multiple theoretical lenses to analyse the *traces* and *cues* that lie behind artefacts and informal interaction of students. Fairclough (1989) points out that “discourse involves social conditions, which can be specified as social conditions of production and social conditions of interpretation” (p. 25). Gaining insight into the phenomenon of informal knowledge sharing demands understanding of the conditions under which information seekers and givers exchange information.

In the next section, I will review my analytical framework with particular focus on how the theories give effect to Fairclough's components of description, interpretation and explanation.

## 5.2 Review of Analytical Framework

I will review the analytical framework introduced in Chapter 3 (see Figure 3.5). In Chapter 3, I drew the connection between theories and the CDA components of description, interpretation and explanation. I also described a relationship between CDA and GST. I will elaborate on the CDA-GST analytical framework and make explicit the link between the theories and components of CDA.

I have already shown the three dimensions of informal knowledge sharing: text, interaction and social context (see Figure 2.2 Chapter 2). This inevitably demands a multidimensional and multifunctional analysis as Fairclough (1992) outlines. According to Fairclough (*op. cit.*), a method of discourse analysis must fulfil the following requirements:

*Firstly, it would need to be a method of multidimensional analysis. Secondly, it would need to be a method for multifunctional analysis. Thirdly, it would need to be a method of historical analysis. Fourthly, it would need to be a critical method. The relationships between discursive, social and cultural change are typically not transparent for the people involved (pp. 8-9).*

The analytical framework (see Figure 5.2) is three-dimensional in that it focuses on text (artefacts), process of production and interpretation of text (interaction), and the social action (interaction draws upon structures). To the extent that the interaction is computer-mediated, it focuses on Computer-Mediated Communication. Rather than focus on general CMC tools a special purpose tool DFAQ is used. The socio-historical background of participants required that interaction be anonymous. The study is located in a complex social system of teaching and learning.

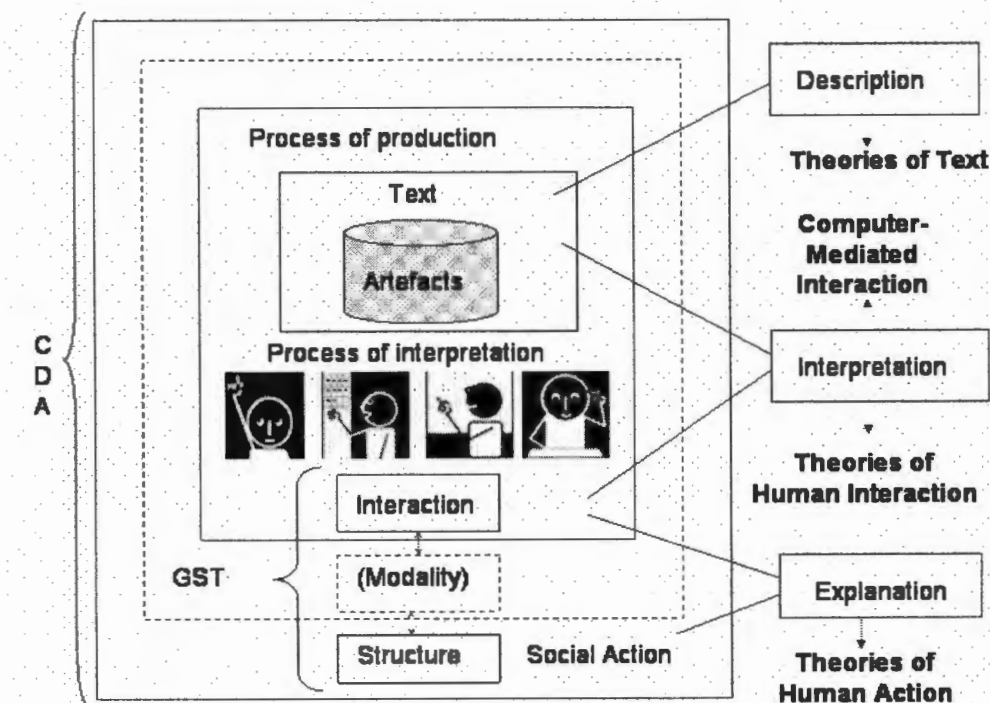


Figure 5.2: Review of Analytical Framework

I will now briefly describe how the different theories add effect to the CDA components:

### **5.2.1 Description**

In the context of this study, text is an outcome of computer-mediated interaction. Text is both a medium and an outcome of computer-mediated interaction. An information seeker transforms intentionality into ostensive text messages. The information giver interprets messages and responds through text. In Figure 5.2, artefacts are an outcome of an information sharing activity between seekers and givers of information. The theories of text give effect to the description component. The objective of these theories is two fold: First, to gain insight into types questions that students ask. Second, to understand the types of knowledge that lies behind student questions.

### **5.2.2 Interpretation**

While the description component focuses on text, interpretation focuses on understanding the production and interpretation process of text. Given that text is an outcome of computer-mediated interaction, the interpretation component will involve an analysis of computer-mediated interaction. I will also use theories of human interaction to give effect to this component.

### **5.2.3 Explanation**

The interpretation component connects interaction to text. The explanation component links interaction to the social action or the structures drawn upon during interaction. In Figure 5.2, Giddens' Structuration Theory (GST) shows the connection between interaction and social action. The theories of human action will give effect to the explanation component.

The rest of this chapter is organised as follows: In the next section, I will analyse DFAQ mediated interaction and DFAQ discourse analysis. In Section 5.4, DFAQ artefacts are analysed using Speech Act Theory and Semantic Networks. I analyse Human Interaction in Section 5.5 and Human Action using Structuration Theory in Section 5.6.

## 5.3 Analysis of DFAQ-Mediated-Interaction

In this section, DFAQ-Mediated-Interaction is analysed from two perspectives: student experience and DFAQ discourse types. The transcripts of references used in this chapter are found in Appendix A and B. DFAQ discourse types are analysed from an interpretive perspective of a DFAQ developer and the experience of users. There are three categories of analysis: social space, educative space and communicative space analysis. DFAQ features are analysed in terms of task, purpose, effect, aim and ambiguities. I have already mentioned that DFAQ is both a medium of communication and an outcome of interaction. DFAQ is an intentionally used tool as Yanin (2004) asserts, "...in advice seeking, the recipient often initiates the process in attempt to improve the quality of her judgment. The goal of influence promotion is manipulative – that is, bringing about change in some preferred direction – whereas a major goal in seeking advice is improving decision quality" (p. 2). Although students did not use DFAQ to improve quality of decisions, they improved *quality* of understanding.

The objective of this section is to analyse the extent to which DFAQ exploited the asynchronous communication to *persist* informal consultations and review the influence that access to DFAQ artefacts had on students' consultation.

Thus the section addresses the following research questions: 1.3.2 *Can student-to-student consultation dialogue persist beyond a consultation session?*; 1.3.3 *In what ways can persistent student-to-student dialogue influence learning and teaching?*; 1.3.6 *To what extent are students able to express their need for information and to what extent is the need for information satisfied through questions and responses?*

### 5.3.1 DFAQ Social Space Analysis

A DFAQ task is an activity that requires user intervention and user initiation. As part of the course, students had to study the writings of Piaget (see Figure 4.5 and 4.6). Students needed to consult one another to gain different perspectives in order to understand the text. However, it was difficult to gain access to both the lecturer and fellow students. This following statement is typical of stories that the class shared.

*If you've made a concerted effort – I mean, on the days that I did see X (name of lecturer), I've had to dash back and forth. And it was really, really difficult and I've normally had to cancel something else, you know, it's just a logistical nightmare, and I just felt that it wasn't worth it (Appendix A. Question 1) or (A. 1).*

The DFAQ environment facilitated student interaction and sharing of information. In particular, DFAQ served as a medium of communication, a space to learn from one another and an environment to mingle with fellow students. A student below points out the context in which students used DFAQ:

*With the working full-time, with all of us that are working, we need a full-time job, to actually be able to pay your fees to do a degree. So all of us are finishing work at 5, and you don't get to the lecturers (A. 1).*

DFAQ mediated interaction of students. Without technology mediation, students would not have collaborated on the task.

### 5.3.2 DFAQ Educative Space Analysis

The purpose of DFAQ was to support authentic student activities of informal knowledge sharing. Students were not surrogates and neither was the study an experimental research. The problem of experimental research in information systems is that “...the very conditions that are set up to provide them with internal validity (i.e. decontextualisation through experimental control) are the conditions that render their conclusions inappropriate for involved managers – or for that matter any involved actor in the world” (Introna and Whitley, 2000).



In the statement below the student's attribution of course marks to the DFAQ environment is indicative of the authenticity of the study context.

*The site played a very big part in being able to get marks in the 70's, at the end of it, even though I didn't have the most enormous amount of time. Because I could actually [cognitively] shift on, and I could actually feel it happening, because I could engage and could take my own time to go through, and I could scroll back (A. 6).*

The statement suggests that DFAQ recruited the student's attention. It kept the student focused on the task even when there was not enough time. Access to the questions asked by other students had a reflective effect in that it made the student think. DFAQ seem to have shaped her actions (behaviour) allowing the student to self-pace her learning. The next statement shows the effect of DFAQ on shaping appropriate student behaviour.

*You can go back and review things once you've had a lecture and actually see, what is it that I understand now, and how was I thinking. So that in itself, the ability to actually go back and login to the site at different stages of your own development, to me was amazing. 'Cause that way you really, it's very concrete. You can actually see how you're growing the whole time (A. 7)*

DFAQ seem to have had an effect on how individual students interacted with one another. The class had access to the questions and responses from individual members as the following statement shows:

*Or a light just goes on and you think to yourself, 'Oh that's...' you know? And then, the more you read other students' questions, the more you're changing, 'because you're constantly having reflect, it's that thing that I said with the Rubic Cube, where you constantly have to look at it in different ways (A. 5).*

The statement is significant for three reasons: Firstly, it provides evidence that student access to knowledgeable peers (see Problem 1.2.1). Secondly, it is evidence of access to shared knowledge (see Problem 1.2.2). Thirdly, it gives hope that DFAQ artefacts had an effect how students thought. The metaphor of a Rubic Cube suggests that access to

DFAQ artefacts exposed the student to different perspectives of questions from other students.

The following effects of the DFAQ educative space is the work of Ng'ambi and Brown (2004). They outline four benefits to students who use DFAQ.

### 5.3.2.1 Value for money benefit

*And for the first time, um, I felt that learning was happening. I could ask questions when I needed to, go at my pace, um, and be exposed to... I think the reason for it is, it is an active environment. It's not the same as, um, like you said, just a chatroom or something, it's actually active; there's movement. Every time you login there's something different; there's more questions; there's stuff that's being answered. So you constantly have to take cognizance. You can't login to it and that's it, stops there. Each time you login there's something different, so you constantly having to rethink and re-look and build and accelerate. And that, to me, was the biggest thing that I felt really strongly about. For the first time it actually felt like I was doing a course that I didn't mind paying for, 'cause I really got my money's worth out of it (A. 14).*

### 5.3.2.2 Academic performance benefit

*I haven't done any education courses, I haven't done any psychological courses, I came in there not knowing a thing. I'd never heard of Vygotsky, I'd never heard of Piaget. So, to be able to manipulate a text and to be able to have, even if it's only 73% of what's being offered that I know, in that short space of time on my level, that's quite amazing (A. 38).*

### 5.3.2.3 Unexpected 'mirrored' benefit

*The site was a window on everybody's development and everybody's growth and everybody's space of learning and level of learning, where you could actually see it objectively, and looking at it from the top and actually seeing where you're at (A. 31).*

#### 5.3.2.4 Cost saving benefit

*You know it would be saving the University and us a lot of money; you know, it just seems so much more efficient, and it seems like such a logical way of doing it. That's why I'm saying it's so ironic that there's this Global Village, that the world's getting smaller, but we don't seem to be doing it, you know? We don't seem to be applying it, you know, as well as we could. And I'm just looking, for me, which was a feature I feel very strongly about, is there is a desperate need for it, um, in classrooms (A. 9).*

In the next section, the Communicative Space view of DFAQ is analysed.

#### 5.3.3 DFAQ Communicative Space Analysis

Although information seeking precedes an information need, seeking information is an intentional activity. An information seeker transforms the need into an ostensive message. The transformation of information need to message is language mediated. Language may constrain the expressivity of intentionality. In computer-mediated interaction, ostensive messages take the form of typed text. Typically, it is impossible to meet unexpressed information needs. However, the statement below suggests the contrary:

*I felt that I was being fed the whole time; as opposed to, you know, "there's your meal, that's it." You know? That's where it stops. That you're actually being... it was tailored to you and to your needs; you could login and ask for whatever. And that, to me, is knowledge, and that is building and I feel like I've actually walked away with something that's rounded... (A. 15)*

The student asserts that her information needs were satisfied before expressing them. This conflicts with the norm. According to student, the pre-emptive effect of DFAQ was because knowledge sharing was amongst peers. This meant that students had shared concerns and hence had similar questions. The metaphor of a meal is indicative of the fact that the student interpreted and made sense of the questions. This is particularly so because in a "hermeneutic conversation, text is expressed through the interpreter" (Gadamer, 1975: 349) who projects their own prejudices on it. For example, in the statement below, the student projects on the questions posted by others as "sort-of silly":

*There were so many sort-of silly questions being asked that you actually felt like, now, you actually got quite fearless about it, where you'd ask whatever you wanted. You asked whatever you wanted because you haven't got a time limit, where the lecture's going to end now and you're not going to waste time, and you haven't got twenty sets of eyes looking at you, scrutinizing you when you ask, and you haven't got people being impatient with you now wasting their time, and you haven't got all those sort-of social baggage that goes with it (A. 34).*

The student uses a *sort-of silly* drawn from her social context. This suggests that the student projected on the questions her prejudices. These prejudices are traces on her mind produced and reproduced by socio-historical background, which could be outside the jurisdiction of the education environment.

### 5.3.4 DFAQ Discourse Analysis

In this section, I will analyse the discourse of DFAQ mediated interaction. Auramaki *et al.* (1988) contend that a "...discourse type is the largest unit of communication that can be realized in office information systems (OIS). A discourse type fulfils specific social goals identified" (p. 130). DFAQ conveys the intentions of information seekers to potential information givers. The information seeker usually has specific goals for using DFAQ. The goal of the information giver is to meet the information needs of an information seeker. Although both seekers and givers have specific goals, the goals can be unambiguous (e.g., asking a question) or ambiguous (e.g., interpreting a response). Auramaki *et al.* (1988) argue, "...a discourse is ambiguous if it is unclear what meanings different terms and predicates have" (p. 133).

The construction of the DFAQ discourse analysis (Figure 5.3) involved comparing the designer's view of DFAQ user activities (see Figure 4.3) with the experience of users. A DFAQ *task* is an activity that requires user intervention and / or user initiation. A *purpose* is the reason for undertaking a task. This involves intentions, which are not always articulated or expressed. An *effect* is the impact that the performance of a task has on other users of the DFAQ. An *aim* is the projected outcome of performing a DFAQ task. An *ambiguity* is a conflict between information need, expressivity of need, and the interpretation process of a question or response by a reader. Ambiguities are thus unintended consequences of a DFAQ task.

Task	Purpose	Effect	Characteristic	
			Aim	Ambiguities
Asking a question	To express intention / desire for information and get the attention of information givers	Send intentions expressed in questions to information givers	To express the need for information without hindrance because of the anonymity of communication	The fact that questions <i>stand alone without identity of an author</i> ; the reader projects their own interpretation on the text; there is no guarantee that responses match original intentionality expressed in a question
Responding to a question	Giving information based on projected meanings motivated by need to help	Shared information based on reader's interpretation and current knowledge level	To give information knowing that the information seeker will need to evaluate this for its appropriateness to an information need which may not have been articulated in a question	Information shared may be based on misunderstanding and may need to be checked for validity given that peers, though knowledgeable, are not experts in the subject area
Viewing questions and answers	Looking up / lurking in the environment for questions that have been posted and responses given	Gain access to the "minds" of a virtual cluster in terms of what and how they think through the questions asked	To allow students absent from a consultation session access to information shared	Passive access to shared information may expose levels of group understanding that could either encourage or discourage an information seeker. For example: realization that everyone is in the same <i>boat</i> would encourage; but realising that others are steps ahead may discourage
Response notification	Notify an information seeker when question has a response	Efficient usage of an information seeker's time by helping her avoid need for repeated checking as to whether question had a response	To email an information seeker whenever there is a new posting to her question	An information seeker may already be satisfied with the responses given to a question and the continuous notifications may lead to unintended outcome of creating confusion

Figure 5.3: DFAQ Discourse Type Analysis (Adapted from: Auramaki *et al.* 1998:139)

### 5.3.5 Discussion

In this section, I have analysed DFAQ mediated interaction. I have analysed DFAQ from two perspectives: student experience and DFAQ discourse. I have shown that DFAQ mitigated the limitation of time constraints of working students and facilitated interaction among students. Students mingled in the environment. DFAQ supported an authentic learning activity. It was therefore not a laboratory experiment. DFAQ recruited student attention; kept students focused on the task and shaped appropriate behaviour. There are four benefits to students: value for money, academic performance, unexpected 'mirror' and cost saving. The communicative view of DFAQ showed some information needs were satisfied before being expressed or aware of them. This section has provided answers to the following questions: 1.3.2 *Can student-to-student consultation dialogue persist beyond a consultation session?*; 1.3.3 *In what ways can persistent student-to-student dialogue influence learning and teaching?*; 1.3.6 *To what extent are students able to express their need for information and to what extent is the need for information satisfied through questions and responses?*

## 5.4 Analysis of Text [DFAQ Artefacts]

The DFAQ artefact analysis will give effect to the "text description" component of CDA. My approach is to uncover what lies behind text (questions) using Speech Act Theory and Semantic Networks. In particular, I will focus of the aspect of knowledge embodied in questions. The objective of this analysis is to address the following research questions: 1.3.4 *What can educators learn about students from students' questioning patterns?* and 1.3.7 *What is the nature of questioning dialogue that happens during student-to-student consultation?*

The approach taken in this section is hermeneutic, in that Speech Act Theory focuses on individual parts (questions) and Semantic Networks focuses overall. The effect of this double view is that artefact analysis is analysed such that "the whole is understood in terms of the detail and the detail in terms of the whole" (Gadamer, 1975:258).

In this section (S) represents a *speaker or seeker* of information and (H) a *reader or response*. I will use a letter to refer to the appendix and a number to the transcript. For example, (B. 1) refers to question 1 in Appendix B. Given my particular focus on questions, Appendix B does not include responses to the questions (see Appendix C). The difference between

Appendix B and C is that B lists all questions posted while C only lists questions with responses.

The text is unedited to both show the challenges of using a foreign language as a medium of informal knowledge sharing and the effect of anonymous communication on student confidence to express themselves. CDA also requires that text be unedited.

In Section 2.6.2, I mentioned that Speech Act Theory is a study of “conversation sequencing and actor’s perception of meaning in conversational exchange” (Reiss, 1985:14). In the next sections, I will analyse DFAQ artefacts from a Speech Act Theory perspective. The analysis is in two sections. In Section 5.4.1, I will analyse the types of questions students ask. In Section 5.4.2, I will focus on the types of knowledge embodied in student questions.

### **5.4.1 Speech Act Theory**

I have already mentioned (see Section 2.6.2) that the difference between Communication Action (CA) and Speech Act Theory (STA) is that CA uses language as a medium of coordinating social interactions while STA treats language as action. This is particularly important in the context of this study because questions are not neutral statements, they are requests for action. There are different actions caused by questions. Some questions may cause a simple action such as a “yes” or “no”.

It seems reasonable to expect that questions posted in the DFAQ are unlikely to be of the type requiring a yes or no answer. Questions that require a yes or no answer tend to close questions and often do not lead to further dialogue. Kiefer (1980:97) argues that questions that cannot be answered well by a plain “yes” or “no” can be explained using the theory of indirect speech acts and the theory of conversation.

#### **5.4.1.1 “Yes” or “No” Questions**

According to Kiefer some of the questions which cannot be appropriately answered with by a “yes” or “no” contain an indefinite pronoun (existential questions) or contain the verb “know”.

In the previous chapter (see Section 4.5.2), I indicated that DFAQ artefacts were one of the empirical materials captured. Students may ask questions that require a “yes” or “no” answer for the purposes of confirming prior understanding or preconception. This type of knowledge sharing is similar to *constative speech acts* (see Section 2.6.2) where a speaker may want to represent to the reader a state of affairs. For example a student who asks, *is it not too cold to play tennis today?* a “yes” or “no” answer may be enough to confirm that tennis will not be played because it is cold. However, for most student questions as Kiefer (*loc. cit.*) rightly observes, a “yes” or “no” would be insufficient.

I will not analyse all the questions for the sake of brevity, but the questions I discuss here represent a similar pattern of observed questioning. As a point of departure, I will consider the following question:

[1] *Can one learn from someone by being in the regular company of that person?* (B. 24)

It would appear that either a “yes” or “no” would be an adequate response. However, such a response without explanation is insufficient. (S) is not necessarily looking for a *person who can learn* but whether this learning is possible. The question is not a “yes” or “no” type but rather a “why-question”. Note that (S) has not asked for *reasons* but it is probable that a *why* would follow if reasons are not given. It is not clear whether (S) is expecting a “yes” or “no” answer as the position of (S) with respect to what she thinks is not explicit. It is likely that (S) may ask further questions depending on the initial response to the first question [1].

#### 5.4.1.2 Questions with presumed context

I will now consider a question in which (S) makes explicit why she needs information. The difference between question [1] and [2] is that in [2] (S) declares *ignorance*.

[2] *I didn't know equilibration happened in three forms, what exactly is a form?* (B. 323)

The use of term “didn’t know” is an admission of ignorance and declaration of knowledge limitation. (S) says, “this is what I know”, and “this is what I do not know”. (S) has made public the state of mind to which only she has privileged access. On first impression, one would think that (S) is asking about the *three forms* of equilibration. However, this is not the case because (S) is asking about the meaning of the word *form*.



Clearly, the understanding of the word form precedes the understanding of the three forms. (S) is mindful of what she needs to understand first before understanding the main question of how “equilibration happened in three forms”.

For some reason, (S) may have intended to conceal some ignorance. When (S) asked the question, her anticipation was that a response would be detailed enough to address the undeclared ignorance. I will compare [2] with similar questions that sought information about the *three forms*.

[3]      *Briefly explain the three forms* (B. 73)

In [3], (S) is explicit about what she needs to know and is confident that a brief explanation will be sufficient. Unlike [2], [3] does not declare what she knows and neither is the reason for which information is sought clear. It is not possible to reach understanding of what (S) is saying in [3] without some pre-understanding (see Section 2.4.2). Pre-understanding establishes an understanding context. In asking the question *briefly explain the three forms*, (S) presumes a shared understanding of context. In this case, (S) is not concerned that [3] may have different meanings should the assumption about shared understanding be untrue. For example, the *three forms* could mean three forms of *water*, which are *fluid, solid, and gas (vapour)*; or the three forms of *art*, which are *realistic, abstract and non-objective*, etc. These examples show that the meaning of a question is dependent on its context without whose understanding it is difficult to give an intelligible response. Although both the three forms of water and art are correct, the information is useless to (S). It follows that a student would find information useful if it is at her level of understanding and is aware of the conditions (context) under which the information is true. Ng’ambi (2002a) observes, “...as additional knowledge was acquired some questions became less popular or the interpretation of what some questions meant changed” (p. 281).

When students answer questions in an examination, they base answers on shared understanding. Ng’ambi (2002a) observes (see Figure 5.4):

- The increase in background knowledge (as time moves from T1 to T2) will render some questions (Q) asked at time T1 with corresponding responses (R) obsolete or irrelevant.

- When a context is changed, and background knowledge remains the same, questions and responses at time T1 become obsolete or irrelevant at T2.
- By tracking background knowledge as at time T1 makes questions and responses reusable for anyone with similar background knowledge and given the same context.

Meanings of questions and responses (Q&R) are relevant (meaningful) at time T1 because Q&R is an outcome of consultation in context.

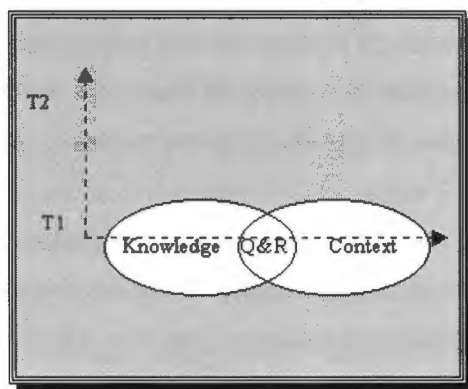


Figure 5.4: Meanings of Q&R (Source: Ng'ambi, 2002a)

Figure 5.5 show that when the context changes at T2, Q&R loses meaning. My argument is that “every process of reaching understanding takes place against the background of a culturally ingrained pre-understanding” (Habermas, 1984:100). I therefore argue that when the culturally ingrained pre-understanding changes, the process of reaching understanding also changes. This may suggest that students project onto text their culturally ingrained pre-understanding.

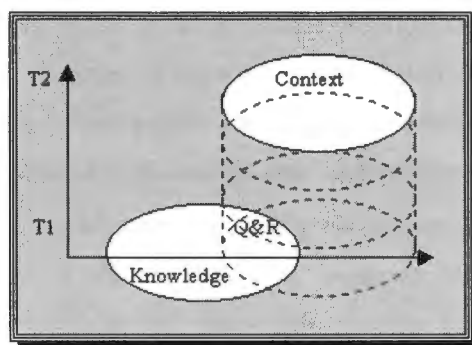


Figure 5.5: Meanings versus change of context (Source: Ng'ambi, 2002a)

### 5.4.1.3 Therapeutic and Aesthetic Questions

In [4] below, (S) is not seeking information on the three forms but rather on the application of the three forms to *equilibration*.

- [4] *How is equilibration achieved in three forms when in fact it is always exceeded? Is that not a contradiction? (B.115)*

In [4], (S) does not just want to ask a question but also influence the reader's view. (S) makes some validity claims which "can be rejected only by way of criticism and can be defended against a criticism only by refuting it" (Habermas, 1984:301). The intention of (S) is to challenge a reader to do something, or to cause the reader to accept that *there is a contradiction*. Question [4] is similar to [2] in that they both reveal to the public aspects of (S)'s mind to which only (S) has privileged access. In both cases, (S) seems open and sincere which creates an opportunity to have the misunderstanding or misconceptions corrected and hence serve as a therapeutic question.

The following questions are similar to [2], [3] and [4] in that they ask about the same concept of *three forms* but (S) has different intentions.

- [5] *Why does equilibration have three forms? (B.116)*  
 [6] *Is there another way of defining the three forms? (B.121)*  
 [7] *Which are the three forms of equilibration and how can these be used in the cognitive development? (B. 314)*

In question [5] (S) is oriented towards reaching understanding. While [4] is explicit on the confusion, [5] does not explicitly expose the confusion in the mind but questions why equilibration needed the three forms. Question [6] suggests an understanding of the three forms, but because that understanding seems not to make sense in relation to equilibration, wonders whether there was another way of defining the three forms. I infer from [7] that (S) knows something about the three forms of equilibration though (S) does not mention it in the question. It appears that (S) is trying to confirm what she knows or intends to test whether the reader knows how the three forms achieve cognitive development. The intention of (S) is to gauge the level of knowledge that the

reader has or to create an opportunity to tell the reader how smart she is. This type of question is aesthetic.

#### 5.4.1.4 Questions oriented towards understanding

Unlike the questions considered above which could be termed as neutral in that they do not suggest how question should be answered, some questions are “conducive to a particular type of answer” (Kiefer, 1980: 98). I will consider two such questions here.

[8] *What is another common word for regulation? Do you think it applies here? (B.61)*

[9] *Pulling a carpet to bring an object within reach constitutes a schema- that sounds like animals have that kind of intelligence? do they? (B. 112)*

In the first part of [8], (S) questions the relevance of the word *regulation* in the context in which it is used. The intention of (S) is to make the reader do something. (S) expects the reader to provide an alternative word and to review the appropriateness of the word in context. The approach used is that of causing readers to consider another word for regulation and in finding this alternative meaning, review the appropriateness of the word in the context in which it is used. The question is therefore assertive in that it expects the answer “no, you are right regulation does not apply here.” Question [9] unlike [8] begins with a logical argument and ends with a question, *do they?* It is a *conducive* question in that (S) expects an affirmative answer. Kiefer (1980) notes that “conducive or biased questions may be answered with a blunt ‘yes’ or ‘no’”. However, I argue that a positive response to question [8] or a negative answer to question [9] requires an explanation without which the response is nonsensical. I infer from [9] that the intention of (S) is to engage the reader in some dialogue. To the extent that (S) is oriented toward reaching understanding, the process of coming to such common understanding is a knowledge acquisition process.

Some questions begin with a prelude argument but take a neutral position. The advantage of such questions is that they give the background of a question and set the scope for a respondent.

Consider for instance the following questions:

- [10] *If knowledge is not "strictly" determined by the knower and objects, how else can it be determined? (B. 10)*
- [11] *Who do you think is the knower in a learning situation, the teacher or the pupil? Why do you say so? (B. 21)*
- [12] *What are these "objects" so constantly being referred to so constantly? How do you feel about this term? (B. 30)*

What is common in questions [10] to [12] is that they all make validity claims. In [10] (S) makes a truth validity claim. This does not mean that (S) agrees with the truth claim but that she questions the validity of such truth. Clearly, the intention is that of reaching understanding. The intention of [11] is to request the reader to make claims of truthfulness of the statement drawn from the subjective world. In [12], (S) asks the reader about *feeling*. In doing so, (S) is making a validity claim of rightness. The intention of (S) is to reach understanding, not necessarily based on truth, but on the subjective view of the reader.

In order to explain the specific nature of these questions, I would like to compare similar questions to [10]. I will consider the following questions:

- [13] *How do interactions between the knower and the objects materialize themselves? (B. 4)*
- [14] *How is the knower and the object interrelated? (B. 144)*

Unlike [10], neither [13] nor [14] is specific on the area of misunderstanding for which clarification is required. In [10], (S) appears to understand that the knower and objects determine knowledge, but the word "strictly" suggests that there are other ways of determining knowledge. Question [13] and [14] are similar to [10] although they do not mention the word *knowledge*. However, [13] and [14] provide cues to resolving [10]. The three questions suggest different levels of knowledge. For example, question [14] implies an understanding of the terms *knower* and *objects*, but expresses desire to know the interrelationship between them. Question [13] like [14] has no problem with the terms *knower* and *object*, but also knows about *interaction*. In asking [13], (S) is asking about how

knowledge becomes an outcome of such interaction. Question [13] is therefore a higher-level question compared to [14]. I infer from the above analysis that questions serve as indicators of knowledge and provide a *window* to what students know.

#### 5.4.1.5 Questions oriented towards deception

I have so far discussed questions that are oriented towards understanding (see [10 – 14]). I will now focus on questions oriented towards success. Habermas (1984) contends that, “in situations of concealed strategic action, at least one of the parties behaves with an orientation to success, but leaves others to believe that all the presuppositions of communicative action are satisfied” (p. 332). According to Habermas (*ibid*: p. 333), there are two types of concealed strategic action (see Figure 5.1): the Unconscious Deception (systematically distorted communication) and the Conscious Deception (manipulation).

The difference between questions oriented towards understanding and those oriented towards success is their deceptive characteristic. These questions tend to have a focused attention. Kiefer (1980) categorizes focused questions as *cleft questions* (p. 106). The *clefted* constituent is a focused constituent.

I will discuss three examples from extracts.

[15]     *In which year did Piaget write this article 1992? (B. 69)*

I have already mentioned (see Section 4.5.1) that students' academic readings were extracts from Piaget's work. In question [15], (S) expresses a desire to know the publication details of the article. Although (S) does not disclose the purpose for which she needs information, the question appears to be irrelevant to the understanding of the given text, in which case, (S)'s action could be strategic (see Figure 5.6). There are two types of strategic actions, concealed strategic action and conscious deception. Assuming that in asking [15] (S) deliberately wanted to obscure the intentions of the question then the action is a *conscious deception action*.



Figure 5.6: Social Actions of Questions (Adapted from Habermas, 1984:333)

In question [16], (S) refers to the reader’s past action (comment / statement) and desires to confirm what she had said. It is not possible to tell whether (S) is teasing or preparing an argument. However, the intention is that of waiting until the reader makes a commitment by way of a response. The deception is that the reader does not know the intentions of (S).

[16] *Are you saying that knowledge is infinite?* (B. 96)

[17] *Is it possible to only assimilate, and then to accommodate much later?* (B. 132)

Question [17] is an example of unconscious deception. In this question, (S) seems not to understand the relationship between *assimilation* and *accommodation*. The question is strategic in that (S) does not disclose whether this question seeks to drag the reader into a controversy. Obviously, it would be insufficient to response with a “yes” or “no” without elaboration.

### 5.4.1.6 Questions with response guide

As the above questions suggest, cleft questions tend to stipulate guidelines for the required response. (S) dictates to the reader how she wants questions answered. (S) may use “manner adverbial” (Kiefer, 1980:107) to indicate how she wants the question to be treated. For example, questions [18] to [20] suggest a response format.

- [18] *Briefly explain the three forms (B. 73)*
- [19] *Briefly describe what you understand by equilibration? (B. 390)*
- [20] *Can you tell me more about accommodation? (B. 223)*
- [21] *Substructures? Is there not a less mechanical description of this word? (B. 93)*

The word *briefly* used in [18] and [19] is an adverb of degree. It suggests the amount of detail required when responding to the question. In both [18] and [19] (S) is looking for concise responses, short and to the point. The reasons could include the fact that she already looked at the details, and do not need that anymore. (S) needs someone to summarize. Contrast this desire for conciseness to a demand for information (see [20]). Question [20] is indicative of (S) having requested information about some concept, received information but found the information inadequate and hence request for more detail. Question [21] is different in that (S) uses an “adverbial modifier of state” (Kiefer, 1980:108). In this case, (S) finds the description of the word, *substructures*, meaningless and irrelevant. (S) then seeks information of how best to describe the word so that it is meaningful and relevant. I argue that adverbial manner questions are similar to cleft questions in that they both are focused questions.

So far, I have analysed “yes” or “no” questions, questions with presumed context, therapeutic and aesthetic questions, questions oriented towards understanding, and questions oriented towards deception. It is possible to have questions that draw from two or more of these attributes. Such questions become complex.

### 5.4.1.7 Complex Questions

Most questions underpinned by arguments are complex. Responding to complex questions require that the reader understands and validates the claims that premise the question.



In the question below, the argument precedes the question.

- [22] *If any knowledge raises new problems as it solves preceding ones begs one to ask why do we endeavor to solve the initial question? (B. 152)*

According to [22], whenever we attempt to resolve Y it produces another X, and that X is undesirable, (S) wonders why we should attempt to resolve Y. The question is both philosophical and complex. By referring to problems, (S) is making validity claims based on the social world. The claim made is that of *truthness*. If I were to rephrase the question it would read, *is it justifiable to spend resources on solving problems whose process of resolution gives birth to other problems that also require resources*. It would be a deceptive question if (S) intends the question to justify withdrawing resources assigned to solving problems. I will give an example of two more complex questions.

- [23] *I understand equilibration to be a balance between assimilation and equilibration. So how do or can a person prove whether cognitive development never took place or rather developed slowly? (B. 365)*

- [24] *If the construction of knowledge is not determined by only the knower but also by the objects which are experiencing the subject matter, how will the pupil realize that his existing knowledge can be expanded to greater knowledge about the same object? (B. 392)*

In [23], (S) begins the question with self-presentation, *I understand*. This means that the argument that follows is only valid if the self-representation is true. In other words, the question is invalid should the grounds of the argument be untrue. For instance, (S) claims that equilibration is a *balance between assimilation and equilibration* but this is not true because equilibration is a balance between assimilation and accommodation. The question is therefore invalid.

Questions [22] to [24] are too complex to answer without engaging in some conversation. To the extent that students asked these questions of fellow students, the knowledge shared in resolving these arguments is useful knowledge for both students and educators.

It is important to mention that students' questioning competence led to complex questions. Most questions that students began with were low-level questions such as identification type questions. Kiefer (1980) points out that in identification questions, "...the speaker asks the reader to identify somebody or something for him" (p. 111). The following are some of the identification type questions.

- [25] *Is this a complex relationship?* (B. 31)
- [26] *Does this refer to sanity or insanity?* (B. 46)
- [27] *Who is the knower?* (B. 1)
- [28] *What is accommodation?* (B. 7)
- [29] *Who determines knowledge?* (B. 13)

Question [25] asks to identify whether a relationship is complex, a yes or no answer is sufficient and no further information is necessary. In question [26] (S) asks a multiple-choice type of question. The expected response will take the form of one word, again without elaboration. Although questions [27] and [28] may appear as simple questions of identification, require definitions or elaboration. The difference between these two questions is that to respond to [27] and [28] with a single word may lead to new questions, *why do you think so?* As for [29] it would appear that (S) expects an identification of who it is that determines that this is knowledge. An identification type question tends to yield less discussion. I need to mention that there are cases when a response to an identification question leads to dialogue as would be likely in questions [27] and [28].

#### 5.4.1.8 Discussion

In the above analysis I have shown that students do not always ask simple "yes" or "no" questions during informal consultations, and that they are not even afraid to ask what is considered to be a *stupid question* for example, [16] and [26] above. The analysis of questions has shown that questions do provide a window of access to the "mind" or mental faculties of students. This access to the mind suggests that an educator looking at the deluge of questions from students would begin to understand the level of knowledge existing in a class. This answers the research question 1.3.4: *What can educators learn about students from how students help each other to learn?*

## 5.4.2 Knowledge Embodied in Questions

The three pragmatic indicators of speech acts (see Figure 2.4) and the aspects of the rationality of action (see Figure 2.3) guide my analysis of speech act based knowledge. The objective of this analysis is to move towards understanding the type of knowledge exchanged among students through informal consultation.

### 5.4.2.1 Technically and Strategically useful Knowledge

A student or speaker (S) may have an information need (desired state) which she wants satisfied. Let us suppose that this desired state is in the objective world, which means the need is definitive in terms of truth, e.g., *what time is the event starting?* The purpose of the question (speaking) is to want the hearer to satisfy the desired state of *time*. This type of action called an *imperative* is only questionable when the hearer (H) fails to find a connection with conditions of satisfaction. For example, if the (H) does not know about the event, he will not be able to help S reach a desired state. The action of S is teleological (the theory that events and developments fulfil a purpose and must happen because of that). Habermas (1984) put it this way,

*the rules of action embody technically and strategically useful knowledge, which can be criticized in reference to truth claims and can be improved through a feedback relation with the growth of empirical-theoretical knowledge (p. 333).*

This knowledge is both technically and strategically useful and is stored in the form of technologies and strategies.

(S) *What is meant by the term 'object of permanence'? (B. 362)*

(H) *The term 'object permanence' refers to the fact that a child begins to perceive that objects continue to exist even when they are no longer visible; that is, objects have an existence that is separate from the child's perception. This generally tends to happen towards the end of the sensori-motor stage.*

The question is oriented towards understanding. (S) has made reference to an objective world in that the meaning of a term is definitive. (S) has expressed a need for information for which she wants someone to respond. In responding to (S), the information giver

acknowledges that she has taken up the message with the words “the term [*in question*] refers to”. Using the term, “this generally tends to...” is indicative of (H) asserting herself. The question posed by (S) is strategic in that understanding the meaning is not an end but a means to understanding the passage in which the term “*object of permanence*” is used. The action of (S) is therefore oriented towards success and is Teleological. The speech act is *imperative* and the knowledge embodied is technically and strategically useful.

#### 5.4.2.2 Empirical-Theoretical Knowledge

The other type of speech act is where a speaker desires to represent to the hearer (H) a state of affairs. A speaker (S) may refer to something in the objective world, and want to cause (H) to act on it, e.g., *is it not too cold to play tennis today?* The speaker (S) represents a state of affairs about the weather, and desires that (H) act on whether to play tennis or not. This type of speech act, *constative speech acts*, makes conversations possible. (H), for example, may contest the validity claim raised by (S) for the proposition stated. The action is oriented towards (S) and (H) reaching understanding. With constative speech acts, the truth of statements is subjective, for instance, at which temperature is it too cold to play tennis? When do we say the weather is cold? According to Habermas (1984):

*...when discursive examination loses its ad hoc character and empirical knowledge is systematically placed in question, when quasi-natural learning processes are guided through the sluices of argumentation, there results a cumulative effect – this knowledge is stored in the form of theories (p. 333).*

In the next extract, I discuss a slightly complex question in that it makes truth claims about something referred to in an objective world.

(S) *If equilibration never achieve even a temporary stopping point, how then is it attainable?*

*If it is attainable then must achieve even a momentary stopping point -temporary.*  
(B. 349)

(H) *Think of the example we used of climbing stairs; we are continually equilibrating. So, you need to think of equilibration as a dynamic force, a motor which drives our learning.*

The speaker (S) makes a validity claim of truth by referring to an objective world of *equilibration* to formulate an argument. In this question, (S) presents the state of affairs and based on truth claims yet is oriented towards wanting to reach understanding. In making these statements (S) invites (H) to have dialogue. These types of speech acts are constatives. We see that (H) instead of engaging in an argument points (S) to a metaphor of climbing stairs. A conversation based on (S) leads to theoretical arguments / discourse and “*this knowledge is stored in the form of theories*” (Habermas (1984: 333). The type of knowledge embodied in constatives is empirical-theoretical knowledge.

### 5.4.2.3 Moral-Practical Knowledge

Instead of referring to something in a social world, (S) may sometimes refer to something in his subjective world. In this type of speech act, *expressive speech acts*, (S) refers to something in his subjective world, which she would like to reveal to a public. The intention of (S) is to let the public know something about an experience to which he has privileged access. For example, *I am lost and confused. Will you please help?* In this case, (S) reveals to the public his state of mind to which only he is privileged. It is not possible to know whether (S) is truthful, but (H) *may doubt* the sincerity of self-representation raised by (S). (H) can criticize (S) as being untruthful or reject the statement as deception or self-deception. Self-deceptions require therapeutic dialogue to resolve and aesthetic practical knowledge is an outcome of such dialogue.

Unlike constative speech acts that refer to something in the objective world, the *regulative speech acts* refer to something in a common social world for which (S) would like to establish as a legitimate. For example, *do you think music piracy is wrong?* To respond to this question (H) needs to contest the normative rightness claimed by (S) in his action. Habermas (1984) suggests that

*...the type of knowledge embodied in normative regulated speech acts is moral-practical in nature. In moral-practical argumentation, participants can test both the rightness of a given action in relation to a given norm, and at the next level, the rightness of such a norm itself (p. 326).*

The next speech act is similar in that it is also oriented towards reaching understanding. It is different in that (S) refers to a social world and therefore makes validity claims of rightness.

(S) *Is the knower the teacher?* (B. 401)

(H) *Goodness, if ONLY we WERE the knowers of everything:-)*

*No, actually, anyone who is acting on the world and constructing knowledge is in the process of becoming a knower; what Piaget refers to here as the knower, is the child. But all of us are in the process of becoming knowers.*

In the above extract, (S) refers to something in a common social world, *teacher*, in such a way that she wants to establish as legitimate a claim that a *knower is the teacher*. To respond to (S) the hearer (H) is conscious of the normative rightness claimed by the actions of (S). For instance, (S) may desire to establish the claim so that she holds Teachers both morally and legally accountable when they do not know something. These speech acts are *normatives* and lead to practical discourse. In other words, the response of (H) is that, *Goodness, if ONLY we WERE the knowers of everything :-)* suggesting that it is not practical for teachers to be knowers of everything. The type of knowledge embodied in the normative regulated speech acts is “moral-practical in nature” (Habermas, 1984: 326).

#### 5.4.2.4 Aesthetic-Practical Knowledge

The final speech act I will discuss is also oriented towards reaching understanding but is different to those discussed so far because it refers to a subjective world.

(S) *I understand equilibration to be a balance between assimilation and equilibration. So how do or can a person proof whether cognitive development never took place or rather developed slowly?*

(H) *Ok, first of all, NOTE that equilibration is a balance between ASSIMILATION AND ACCOMMODATION; second, we cannot ever say that cognitive development does NOT take place; of course it always does. It is not exactly clear what you mean, in the second part of your question; whether cognitive development happens quickly or slowly doesnt effect HOW it happens, i.e. through accommodation, assimilation and equilibration.*

The speaker (S), as the only one privileged to her/his subjective world of understanding and reveals this world to the public. (S) makes validity claims of *truthness* through a declaration of what the word “equilibration” means. The reference to self “I” is important in that (S) makes a self-representation. In doing so, (S) does not only want to let the public know about an experience to which she alone is privileged but wants to reach

understanding. The motives of (S) could include wanting the public to appreciate the “style or tastes”, the “inner beauty” of his/her subjective world. To this end, an expressive speech act embodies aesthetic-practical knowledge. However, (H) noticed that (S) had misunderstood the concept which (S) claims to understand. The correction is therapeutic in that it “cures” the misunderstanding. It follows that expressive acts are therapeutic and aesthetic in nature.

#### 5.4.2.5 Discussion

In this section, I have analysed knowledge embedded in questions. I based the analysis on implicit rather than literal meanings of questions. To show how this approach gives effect to the CDA component of description, Fairclough (1992) contends,

*Text analysis can be organized under four main headings: ‘vocabulary’, ‘grammar’, ‘cohesion’ and ‘text structure’. These can be thought of as ascending in scale: vocabulary deals with additional words, grammar deals with words combined into clauses and sentences, cohesion deals with how clauses and sentences are linked together, and text structure deals with large-scale organizational properties of texts (p. 75).*

In the context of this study, the Speech Act analysis for understanding knowledge embedded in text is a higher level of text analysis. At this level, the analysis focuses on characteristics and functions of text, which are implicit. In particular, uses validity claims and world relations to determine the orientation of action. Figure 5.7 summaries the speech acts oriented analysis for understanding knowledge embedded in text.

In this above analysis, I have discussed the following speech acts: imperatives; constatives; normatives; and expressives. There are four types of knowledge associated with questions: technically and strategically useful knowledge (imperative); empirical-theoretical knowledge (constative); moral-practical knowledge (normative); and aesthetic-practical knowledge (expressive). This answers the question 1.3.4: *What can educators learn about students’ questioning patterns?* and 1.3.7: *What is the nature of questioning dialogue that happens during Student-to-student consultation?*

Formal Pragmatic Features Types of action	Characteristic Speech Acts	Functions of Speech	Action Orientations	Basic Attitudes	Validity Claims	World Relations
Strategic Action	<b>Perlocutions Imperatives</b>	Influencing one's opposite number	Oriented to success	Objectivating	(Effectiveness)	Objective world
Conversation	<b>Constatives</b>	Representation of states of affairs	Oriented to reaching understanding	Objectivating	Truth	Objective world
Normatively Regulated Action	<b>Regulatives</b>	Establishment of interpersonal relations	Oriented to reaching understanding	Norm-conformative	Rightness	Social world
Dramaturgical Action	<b>Expressives</b>	Self representation	Oriented to reaching understanding	Expressive	Truthfulness Subjective world	

Figure 5.7: Type of Linguistically Mediated Interaction (Source: Habermas, 1981:329)

### 5.4.3 Semantic Networks

Questions are intelligible only when we know the context in which they are true. If the context is unknown, knowledge embodied in questions is invalid. However, meanings of questions and responses change whenever the context changes. Figure 5.8 shows knowledge and context at two different times, T1 and T2. In the context of this section, time T1 and T2 refer to questions of 2002 students and 2003 respectively. In both cases, the context was the same. Students had the same readings (see Extract 1 - Figure 4.5 and Extract 2 – Figure 4.6).

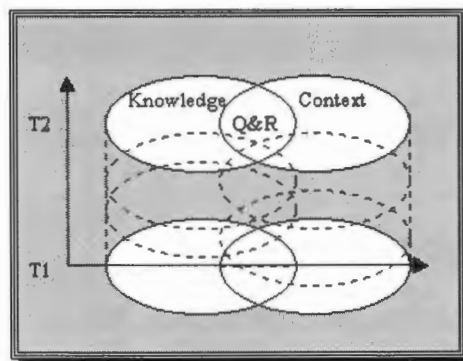


Figure 5.8: Q&amp;R for 2002 and 2003 (Adapted from: Ng'ambi, 2002a)



There were 233 questions in 2002 (T1) and 403 questions in 2003 (T2). The questions at time T2 do not include T1 questions. This was important to ensure that I observe the questioning patterns of two cohorts of students. In the next section, I will describe the analytical tool used.

5.4.3.1 Description of Text Analyzer

I used a text analyzer [Text Analyzer 2.1 © Micro Systems Co. Ltd] to determine important concepts, based on word and word combinations. Figure 5.9 shows part of the analyzer’s user interface.

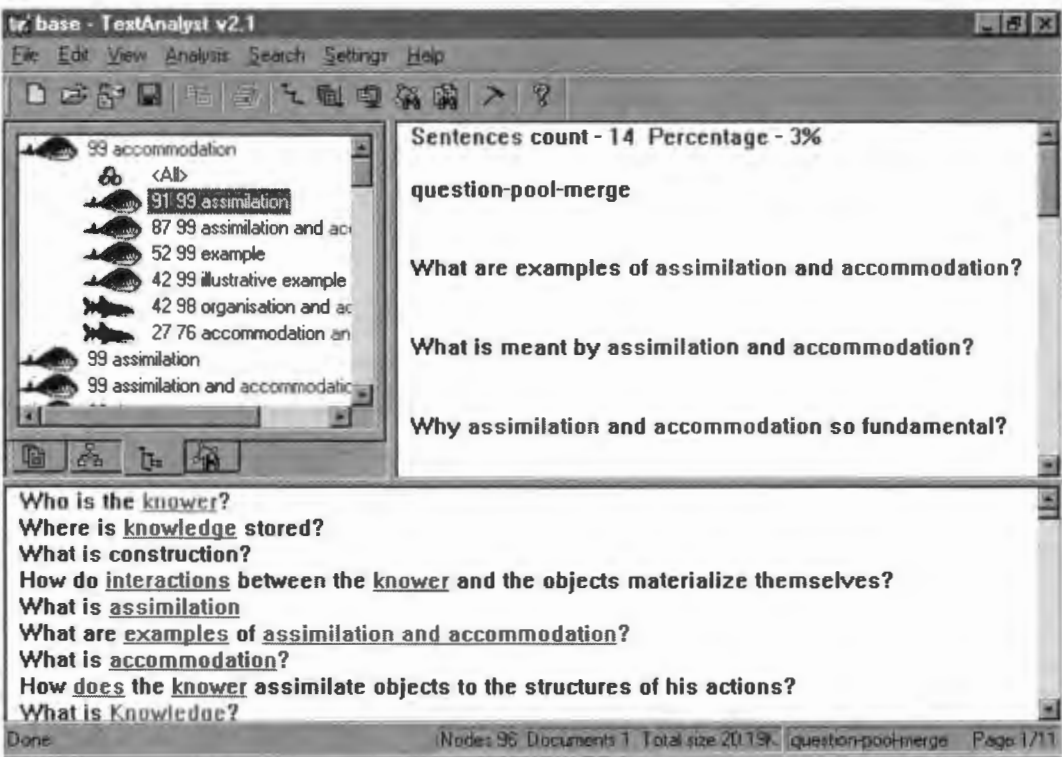


Figure 5.9: Text Analyzer User Interface

There are three windows of the Analyzer (see Figure 5.9), the top left, top right and bottom window. In the top left window, each concept has a number called a numeric semantic weight. The weight assigned to each concept is a measure of the probability that the concept is important. For example, 99 is the highest weight, meaning a concept has a high importance probability. In addition to importance probability, the text analyzer determines

the weights of the relations between individual concepts in the text and hyperlink concepts. In Figure 5.9, the hyperlink concepts are in the bottom window and the top right shows the relationship between concepts. The resulting structure, called a Semantic Network, is a set of the most significant concepts distilled from the analyzed texts, along with the semantic relationships between these concepts in the text. The Semantic Network is a cyclical graph holding all the most important information from the investigated text in a very concise form.

### 5.4.3.2 Analysis

The Text Analyzer generated the results I discuss in this section. During the pilot in 2002, students only had access to Extract 1. Figure 5.10 shows the significance of the concepts distilled using a Text Analyzer.

76	assimilation								
	77	Accommodation							
			86	assimilation and accommodation					
99	knowledge								
	99	Does							
			54	action					
					25	schema			
							31	schema of action	
			99	knower					
			98	does knowledge					
			16	equilibration					
					5	stopping			
					6	cognitive equilibration			
			46	role does					
			60	intelligence					
					16	sensori			
					91	piaget			
							94	does piaget	
			99	accommodation					
					99	learning			
							99	Does accommodation	
	86	development							
			94	development of knowledge					
	99	environment							
			99	interaction					
			99	organism					
	99	problem							
			99	preceding one					

Figure 5.10: Analysis of Questions at T1 (2002)

The numeric values assigned to concepts indicate the probability of importance of a concept. For the sake of brevity, I will highlight concepts of the highest weights i.e., 99. According to the results of the Text Analyzer, the concept of *knowledge* was the most important. The Text Analyzer associated the concept *does, environment, and problem* with the concept of *knowledge*. In other words, questions about knowledge were associated with *does, environment, and problem*. For each of the concepts, it is possible to drill-down for further relationships of importance.

There are two concepts that dominated the questioning, *equilibration* and *knowledge*. The concept of equilibration in relation to assimilation was important. Questions of knowledge were about its relationship to the concept of knower.

Figure 5.11 depicts the probability of importance of concepts for questions posted in 2003.

99	equilibration												
	62	stopping											
		55	temporary										
	25	three											
	61	cognitive equilibration											
	99	assimilation											
		98	development										
			76	development of knowledge									
			95	cognitive development									
		97	assimilation and equilibration										
			97	reading									
		56	fundamental										
			97	relation									
				52	fundamental relation								
		99	accommodation										
			99	assimilation and accommodation									
				98	organisation and adaptation								
			99	example									
				99	illustrative example								
			76	accommodation and assimilation									
	96	simple											
		96	simple association										
		88	association										
99	knowledge												
	98	problem											
		97	preceding one										
	99	knower											
		23	teacher										
		99	interaction										
			99	environment									
				99	organism								
			35	referred									

		23	pupil								
	58	being									
		66	human being								
	99	does									
		89	does knowledge								
		16	child								
		97	accommodation								
				86	learning						
						25	referring				
				97	does accommodation						
				23	assimilation and accommodation						
		16	person								
		42	action								
				5	operation						
				7	schema						
						8	schema of action				
		76	does equilibration								
		10	equilibrium								
		23	role does								
		98	piaget								
				20	intelligence						
				88	does piaget						
				27	theory						
						36	ie				
				23	year						
				23	method						
	25	learner									
		5	information								
	23	construction of knowledge									

Figure 5.11: Analysis of Questions at T2 (2003)

### 5.4.3.3 Discussion

It is difficult and time consuming to distil from questions the important concepts and their association with other concepts. However, such knowledge is invaluable for understanding the “big picture” of what students’ problem areas are to inform the development of remedial intervention. The typical approach of frequently asked questions wrongly presumes an association between frequencies of questions with importance of concepts.

In contrast, the potential of semantic networks lie in the extraction of useful knowledge in terms of the probability of importance and concept association. This knowledge is invaluable for decision makers or educators who have to devise suitable and timely interventions. In the above cases, the educator knows of the concepts with which students are struggling and may respond by giving students additional information, for example.

To view DFAQ artefacts from the perspective of Semantic Networks means that knowledge about topics of interest or concepts of concern is available on demand. The change in patterns of questions in terms of focus would be invaluable knowledge to educators. This answers the questions, 1.3.4 *What can educators learn about students from students' questioning patterns?*

In this section, I have analysed the DFAQ artefacts in terms of Speech Acts and Semantic Networks. The Speech Act theory categorised the type of questions and for determined types of knowledge embedded on questions. Semantic Networks showed that topics of interest or concepts for which students asked questions changed over time. The Text Analyzer assigned numeric semantic weights to concepts and provided a quick way of determining the progression on topics or issues about which students informally shared information. In Section 5.3, I analysed DFAQ Mediated Interaction. In the next section, I focus on the effect of DFAQ mediated consultation on human interaction.

## 5.5 Analysis of Human Interaction

The analysis of human interaction gives effect to the analysis of the process of production and interpretation of text in CDA (see Figure 5.2). Fairclough (1992) points out that,

*Analysis of a particular discourse as a piece of discursive practice focuses upon processes of text production, distribution, and consumption. All of these processes are social and require reference to the particular economic, political, and institutional settings within which discourse is generated. Production and consumption have partially socio-cognitive nature, in that they involve cognitive processes of text production and interpretation which are based upon internalized social structures and conventions (p. 71)*

The institutional context in which I view human interaction is not interaction void of a mediating tool. In other words, I am concerned with DFAQ mediated *production, distribution, and consumption* of knowledge where knowledge is an outcome of human interaction. The objective of the analysis is to address the following research questions:

1.3.1: *How does anonymous computer-mediated interaction influence the question-driven knowledge acquisition among students?* 1.3.3: *In what ways can persistent student-to-student dialogue influence learning and teaching?* 1.3.5: *What is the impact of anonymous student-to-student consultation on*

*questioning and responding to questions? 1.3.6: To what extent are students able to express their need for information and to what extent is the need for information satisfied through questions and responses?*

In the context of this analysis, DFAQ is a material resource “drawn upon by parties to interaction and reproduced through duality of structure” (Giddens, 1984: 69). Given that interaction was anonymous, I will treat anonymity not only as a feature of DFAQ and but also as a resource, which students drew upon during interaction. The convenience of asynchronous communication and access to other students’ contributions are two other resources capable of influencing human interaction. In this section, I analyse the three resources: anonymous communication; text-based communication; and access to shared knowledge.

### **5.5.1 Effect of Anonymous Communication**

DFAQ mediated knowledge sharing is anonymous. Students drew upon anonymity as a resource to ask questions they would otherwise not ask for fear of being associated with “stupid” questions. The effect of anonymity was the breaking of psychological barriers as this pointed out here:

*And I think a big reason was barriers were broken down, because all of a sudden you realise, where, I mean, I, sort-of, I can remember when I read the first text, kind-of looking around and thinking, “I’m not supposed to be here. I feel really stupid ‘round about now!” And just thinking, when I posted something then I just thought, well, I’m just going to, nobody knows that it’s from me, I’m just gonna post all these questions. And I posted basic, basic things, you know, if I look back now, I can see that, they, I clearly didn’t understand basic concepts (A. 10).*

In (A. 10) the student drew upon DFAQ anonymity as a resource, and this influenced the interaction. The narration in the above statement could be typical of how other students felt at the time. Although the student mentions that the questions posted were “basic”, this categorisation of questions only happened as a reflective practice. Obviously it was only when the student understood the answers that the questions appeared “basic”.

The student (A. 10) distinguishes between herself as a questioning agent from the questions themselves. Anonymity provided a way of “hiding” self and focusing on the subject matter. There was therefore a way of shifting attention from the source of a

message to its content. I use the term content loosely as in the difference between a message and a messenger. In this case, the messenger is the source and the message is meaning which the messenger is transmitting. In the next statement, the student uses a metaphor of starting on a course as a baby and that sharing knowing is how the baby grows.

*What's really nice is even though you're learning, and you don't know a lot, and, like, you know, you start off really as a baby in a course, 'cause you don't know... But, if you know that your opinion matters, you're going to be impassioned to carry on learning (A. 17).*

The interaction of the baby metaphor gives a way of thinking of anonymity as a necessary resource for the protection of the baby. I infer from the metaphor, that the baby suggests triviality, simplicity, naivety etc. DFAQ may have provided a way for babies to share knowledge with fellow babies, and created a way of growing together. Drawing on the anonymity resource allowed the student to feel that his/her opinion mattered.

*As a student it's quite nice to know that your opinion is valued. To realize that the little bit that you do know amongst yourselves does matter. It's quite, and it's good, 'cause I think it's a marker, like you know, that you are going somewhere; you know you're on the right path (A. 20)*

The above statement could explain why students seek information from peers. The reason is that with peers “the little bit that you do know amongst yourselves does matter”. The duality of knowledge sharing among students is that an effort to help someone understand something reproduces an understanding to the person explaining it. This process demands that the “little bit” that students know is used for de-constructing and constructing of knowledge.

### **5.5.2 Effect of Text-based Communication**

I will now discuss the material resource of text. In the context of this section, I am not viewing text as an artefact of human interaction but as a resource drawn upon during human interaction. In other words, text is a product of DFAQ mediated interaction and text reproduces the interaction. An interacting human uses text to communicate and reads text to reproduce the interaction. The role of text in reproducing human interaction

suggests that text is a resource drawn upon during interaction. In this section, I will discuss text as a resource.

Students not only posted questions in the DFAQ but read questions posted by other students. The statement below suggests that reading of other people's questions had an effect on interaction.

*Whereas, with this (DFAQ), you could actually, for me, one of my biggest learning curves was, um, looking at other people's questions. A lot of mine were answered by looking at how other people think. 'Cause you immediately get things mirrored (A. 4)*

In the above statement, the student is alluding to a pre-emptive of DFAQ environment. In Section 1.5.1.1, I mentioned that FAQ lists were compiled a pre-emptive future questions. The "mirror effect" referred to in the statement is indicative of the underlying reasons for which FAQ lists are compiled. However, the weakness of static FAQ lists is that they fail to take into the changing information needs of readers. The dynamic nature of DFAQ meant that the student would return to the environment and find different perspectives to the same questions and /or new questions. Although the above statement suggests that "lot of mine were answered", the student had access to questions she may not have thought of asking. Ng'ambi and Hardman (2004) observe "...the environment provides learners with a unique 'space' in which to access questions and responses that they might not have generated themselves" (p. 95).

Drawing upon the DFAQ text may have had another effect on the interaction as this next statement suggests.

*To me as a student, what was amazing was being able to go back – those questions didn't disappear. I could actually go back and look at things. So you actually, you've got a marker, you can actually go back, and it's kind-of fitting. It's like having grappling hooks when you climb – you can actually see where you've come, and you've got something to measure by, and it's active (A. 30).*

The statement suggests drawing upon the text resource allowed students to measure their own questions against other questions. This measuring effect may have had an effect on interaction. There are two ways in which this measuring could have affected interaction: a)



if a student felt that other students were asking complicated questions, there may have been a tendency to withdraw their relatively simple and naive questions, b) if a student felt that the questions being asked were too basic and simple, they may have been encouraged to respond. The use of the term “grappling hooks” suggests that the text resource may have shaped and guided interaction.

Figure 5.12 shows an example of a DFAQ mediated text communication. In particular, the figure illustrates the entering of a text response in the DFAQ environment. Both the question and response remain in the environment for other users to access.

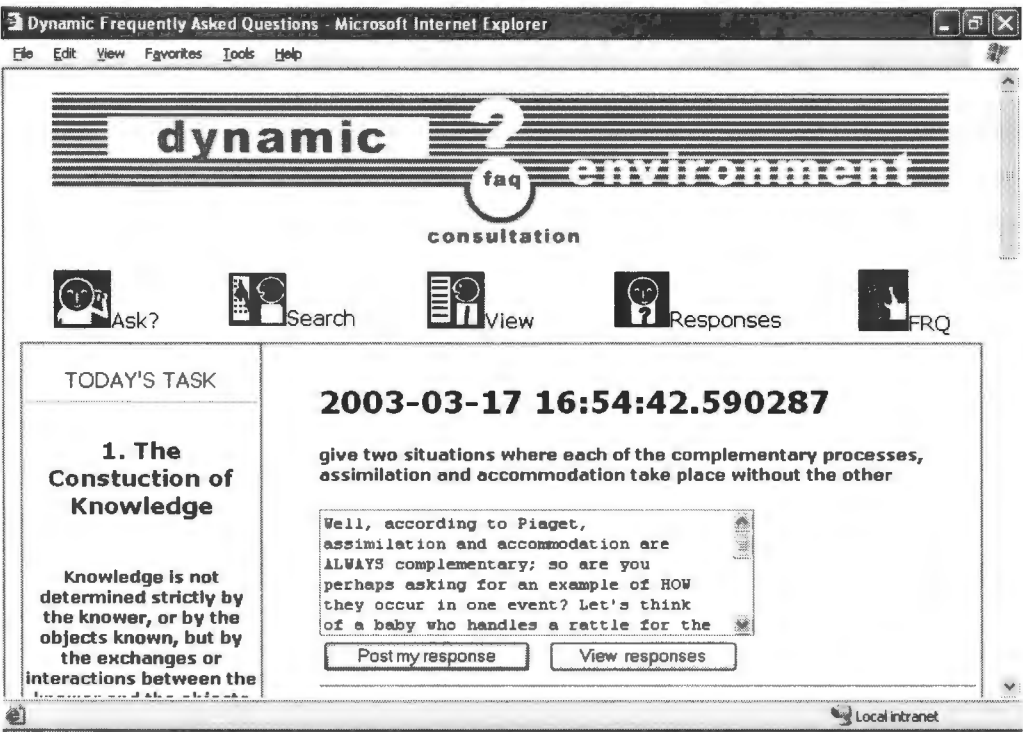


Figure 5.12: Text-Based Communication

5.5.3 Effect of Shared Knowledge on learning

In the previous two sections, I discussed anonymity and text as resources drawn upon during interaction. In this section, I will discuss the duality of knowledge construction and de-construction Knowledge sharing is a process of de-constructing and constructing knowledge. To this extent, knowledge sharing is a process of learning. Figure 5.13 depicts the construction and de-construction of knowledge.

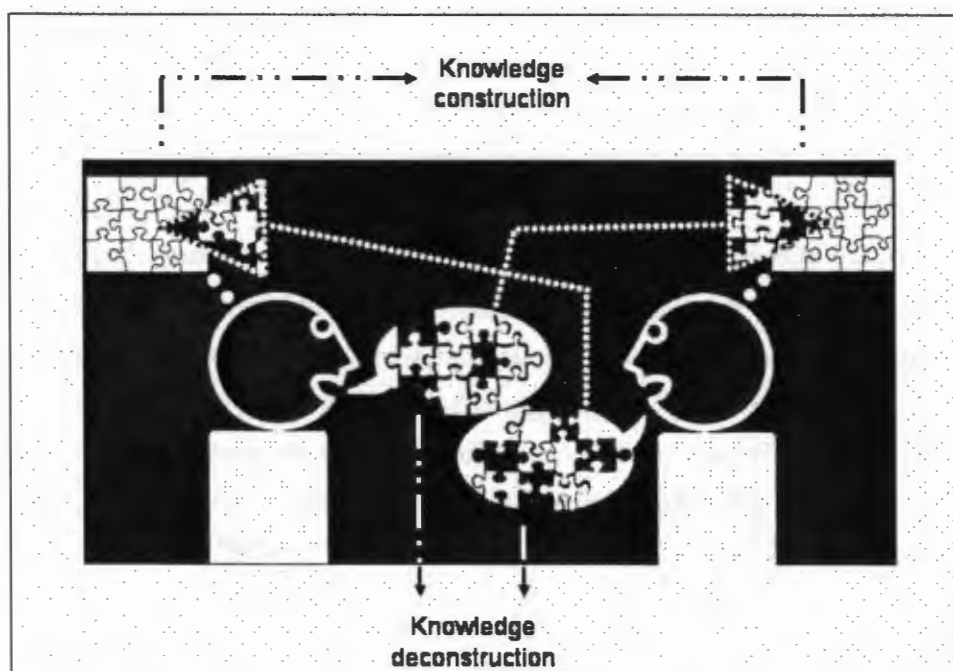


Figure 5.13: Knowledge Construction and De-construction

Thus, the purpose of this analysis is to gain insight into the effect of DFAQ mediated interaction on the student's construction and de-construction of knowledge. To this end, I start with the following student comment:

*And for the first time, um, I felt that learning was happening. I could ask questions when I needed to, go at my pace, um, and be exposed to... I think the reason for it is, it is an active environment (A. 14).*

In the above statement, the student's reference to learning having happened is a reference to the mental construction of knowledge. I am not interested in how a student defines learning but rather in the student's subjective view of learning. In this case, according to student's subjective view, the student "felt that learning was happening". The student attributes his/her learning to the "active environment". My understanding of the statement is that DFAQ provided a space in which students were engaged in a continuous "de-construction" process (see Figure 5.13). The statement below is a typical case in point:

*I felt that I was being fed the whole time; as opposed to, you know, "there's your meal, that's it." You know? That's where it stops. That you're actually being... it was tailored to you and to your needs; you could login and ask for whatever. And that, to me, is knowledge, and that is building and I feel like I've actually walked away with something that's rounded... (A. 15)*

The metaphor of being "fed the whole time" suggests a continuous supply and intake of "food". This means that the dynamic nature of DFAQ provided a space for knowledge de-construction and construction. The student compares two methods of knowledge acquisition, one in which she is actively involved in the construction of knowledge, and the other in which she is passively involved. In the latter, the description phrase is "there's your meal, that's it" and in the former it is "fed the whole time". According to the student, knowledge is an outcome of interaction ("ask for whatever") pitched at the understanding level of an interacting agent ("tailored to you and to your needs"). This view is supported by a student who asserts:

*It's very easy to go to lectures and to memorize stuff and write down, in the exam, and get an A. But can you apply it? And you can't apply it unless you've actively engaged in it; unless you've manipulated that knowledge; unless you've had to explain it. Every time you do that you have to rethink it, and that was the amazing thing for me with the questions; 'cause every time a question was posted by my peer, it was on my level so I had to go and re-think (A. 23)*

The above statement explains the reason why students seek information from peers is that they share the level of understanding, "it was on my level so I had to go and re-think". The advantage of this is that students help one another to de-construct and construct knowledge: "you've manipulated that knowledge; unless you've had to explain it". The student distinguishes between memorizing and constructing knowledge. She associates knowledge acquisition with knowledge sharing ("unless you've had to explain it"). The process of manipulating and explaining knowledge requires a safe environment. The anonymity of DFAQ mediated interaction seems to have created the safe space for the construction, de-construction, distribution and consumption of knowledge as pointed out by a student in the following statement:

*It's a safe environment where you've got the anchors, to go and ask questions and look at things, review things and think things through. I've found you just go to your next lecture just a little bit more mature, sort-of on the next scaffold, slightly. You just step from one phase of your development to another but more comfortably and with more confidence; as opposed to kind-of grappling (A. 27)*

The student particularly refers to the process of “review things and think things through” which is indicative of a de-constructions and construction. The usage of the term “sort-of on the next scaffold” suggests successful knowledge acquisition.

### 5.5.4 Discussion

Anonymity encouraged participation as Ng'ambi and Hardman (2004) observe “...posting questions anonymously enabled many learners to participate: they were not hindered from expressing themselves” (p. 195). Students tended to feel safer, less anxious, and felt that their opinions were valued. While anonymity concealed personal identities, it preserved individual voices as Ng'ambi and Hardman (2004) report: “The learners’ consultation base enlarged because every learner had access to every other learner through a common environment in which personal identities were concealed but learners’ individual voices were preserved” (p. 195). This answers that question: 1.3.1: *How does anonymous computer-mediated interaction influence the question-driven knowledge acquisition among students?* and 1.3.5: *What is the impact of anonymous student-to-student consultation on questioning and responding to questions.* I have also shown that the text-based communication, and in particular that *persistence* of the DFAQ artefacts has a “mirror” and a “grappling hooks” effect on students. This addresses the research question 1.3.3: *In what ways can persistent student-to-student dialogue influence learning and teaching?* Access to shared knowledge stimulated student participation because questions were at their level and tailored to their needs. This addresses the question: 1.3.6: *To what extent are students able to express their need for information and to what extent is the need for information satisfied through questions and responses?*

In the next section, I analyse students (human) actions using Giddens’ Structuration Theory.

## 5.6 Analysis of Human Action – Structuration Theory

In this section, I will use Structuration Theory to analyse the social action of knowledge sharing. In Section 2.7, I discussed human action from Giddens' Structuration Theory perspective. In this section, I will use Jones and Karsten's (2003) summary of the features, implications and potential issues (see Figure 5.14) of Structuration Theory to IS research as a guide to my discussion.

Feature of Structuration Theory	Implication	Potential issues
Duality of structure	Structure and action are inseparable and co-existent	Structure exists only through action. It never pre-exists action
Structure is a "virtual order of transformative relations"	Rules and resources exist only in their instantiation and as memory traces orienting conduct	Material resources, such as technology, influence social practices only through their incorporation in processes of structuration
Essential recursiveness of social life	Structure is produced and reproduced in every instance of action	Social phenomena are temporary regularities in an ongoing process
Agents always have the possibility to do otherwise	Structural constraint simply places limits upon the feasible range of options open to an actor in a given circumstance	Compliance with structural constraint implies choice to do so
Agents are knowledgeable about their actions and continuously reflect on their conduct	Agents are aware of their condition and reflect on it	Agents may not be discursively aware of their knowledge
Unacknowledged conditions and unintended consequences	Production and reproduction of society is not wholly intended or comprehended by social actors	Social generalisation are temporally and spatially circumscribed
Routine is integral to the continuity of the personality of the agent... and to the institutions of society	Individual identity and social institutions are sustained through routine	The seed of change is there in every act which contributes towards the reproduction of any 'ordered' form of social life
Time space distancing	Societies "stretch" over spans of time and space	The importance of face-to-face interaction for social integration and the capability of technologies to facilitate integration "at a distance"

Double hermeneutic	Concepts that sociological observers describe are already constituted as meaningful by social actors and can themselves become elements of the actors' understanding of their own condition	Social actors can reflexively appropriate the researcher's understanding of their condition
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Figure 5.14: Key features of Structuration Theory, their implications and some potential issues for IS (Source: Jones and Karsten, 2003)

In this section, I will draw connections between some of the key features of Structuration Theory and the issues of DFAQ mediated human action to address the following research questions: 1.3.1: *How does anonymous computer mediated interaction influence the question knowledge acquisition among students?* and 1.3.6: *To what extent is the need for information satisfied through questions and responses?*

### 5.6.1 Duality of Structure

In Chapter 1, I mentioned that informal knowledge sharing already took place among student clusters. The limitation of face-to-face interaction is that interacting parties ought to be present in the same location and time. Giddens (1984) argues that, “the term face-to-face does convey a sense of the importance of the positioning of the body in space in social interaction. The face is of course normally the focus of attention in social encounters, and as the most expressive part of the body is chronically monitored by actors in checking upon the sincerity of the discourse and acts of others” (P. 203). While face-to-face interaction helps in checking sincerity of discourse and acts of others, it is difficult to both observe and capture.

The capabilities of CMC and in particular DFAQ extended student interaction beyond the limitation of time and space. It also allowed artefacts of interaction to “persist”. DFAQ facilitated interaction of geographically dispersed students who felt that

*...it's not fair because we working full-time, that we haven't got access to it. I mean, and the lecturers... and often it's not necessary to make a whole appointment (A. 8).*

The term “make a whole appointment” is a reference to time. DFAQ mediated interaction “stretches” time limitations. Students are conscious and knowledgeable about their actions. For instance, they know what types of actions are required in face-to-face interaction and when the interaction is computer mediated. Although students are therefore continuously aware of the prevailing conditions “compliance with structural constraint implies choice to do so” (Jones and Karsten, 2003). The student made a choice to post questions.

*I'm just going to, nobody knows that it's from me, I'm just gonna post all these questions. And I posted basic, basic things, you know, if I look back now, I can see that, they, I clearly didn't understand basic concepts (A.10).*

The term “nobody knows that it's from me” is indicative of either fear or lack of confidence. The statement suggests that the student did not ask questions without combing the surroundings. In the next statement, I discuss how routine sustains social institutions.

*...not have the fear of, I've got completely the wrong tail-end and I look completely ignorant; 'cause it's like that when you go into a class with new people (A. 11).*

In the above statement the phrase “it's like that when you...” suggests a pattern of occurrence. The next statement shows the production and reproduction of structure.

*It's a safe environment where you've got the anchors, to go and ask questions and look at things, review things and think things through...(A.27).*

In the above statement, asking questions is a human act and “review things and think things through” is structural. The review of things and thinking things through is a product of questions, and produces questioning.

It is not possible to separate structure and action. To the extent that the two co-exist, actions provide a way of understanding structure. This statement suggests that actions are a window to the structure.

*But this is almost like having a window on the student's brain and their development, as such. So if they login on different levels, you actually have got a window on their development; you can actually see where they're going. And it would allow you to, um, that's why I say, I can't believe we don't use it, because it would allow you to structure your lectures in such a way that you're specifically guiding it (A. 25).*

The view of the student (who is a teacher by profession) is indicative of the potential of gaining access to the structure in terms of influencing human action. If we can "see where they're going" then we can direct students where they should go.

DFAQ is a material resource which interacting parties draw upon during interaction. One of the rules of using DFAQ was that questions had to be typed and were anonymous. The influence of DFAQ on student interaction includes exposure to other students' questions. Jones and Karsten (2003) contend, "...production and reproduction of society is not wholly intended or comprehended by social actors".

*...you can actually smile because you can see where the student who most probably tried to answer the question was trying to engage in giving the right answer but the answers were not always spot on the way you were satisfied but you could look at another response and another response and in that sense it was actually very interesting to see what other students had written about a question...(A. 46).*

The above statement suggests that the student knew what constituted a good response and used the knowledge to evaluate responses. I infer from the statement that knowledge acquisition could be unintended. Furthermore, information givers were not aware of the effect their responses would have on the readers.

#### **5.6.1.1 Student understanding and its exhibition**

Informal knowledge sharing is a wicked problem that is difficult both to observe and to capture. Although DFAQ provided a way of asking questions anonymously, students could only ask from discursive knowledge. Jones and Karsten (*loc. cit*) contend, "...agents may not be discursively aware of their knowledge". In the statement below, the student explains why she preferred not to ask questions for fear of looking stupid.



*...you were actually meant to read this week and you didn't, So what you're going to do is be really quiet because that's going to be a complete dead giveaway, then rather fall behind, for fear of looking stupid, you know? (A. 33).*

The statement suggests that fear of looking stupid is subtly exhibited through quietness. The student would remain quiet because of an understanding that a question would reveal her/his level of knowledge. The contrasting statement below shows that DFAQ mediation tended to alter a state of mind, which in turn had an effect on action.

*I just think it takes a huge anxiety away because if one could have access to DFAQ there would be no reason to misunderstand or to not have things substantiated, so if that was in schools and I just look at the schools for myself, if that was available in classrooms, I was thinking of accelerating the situation, if this environment was available so that you could lay out projects for them, you would not have the problem of kids in the class who have different needs, so I think in the classroom setup definitely, at schools and at varsity level, more and more students have to work full time and you don't have access to one another either so much anymore as you do other graduates who are on campus all the time (A. 66).*

The sense of anxiety is synonymous with a sense of being overwhelmed and failing to cope with pressure. Interacting agents are always conscious of the surrounding that includes checking their own feelings of fear, anxiety etc. during interaction.

In addition to fear and anxiety, consciousness of moral issues also affected interaction. In the next statement, the student refers to honesty and offensiveness.

*And then it is also more honest because everybody comes with their own background on it and I think it is more of an honest view and for me it starts becoming more about the subject content than more about not offending anyone, for me you all have the same goal as opposed to thinking I don't really know that person, it is just more honest and it becomes more task specific or subject specific, you cut to the chase, there is no airs and graces and nobody gets offended (A. 74).*

The anonymity of the interaction allowed students to focus on the content rather than the source messages. This focus made the environment "more honest" because it was "task specific or subject specific" and not *people* focused. The significance of this was that

validity checks applied to messages and sources. The word “honest” suggests a subjective mental consciousness of what is right and wrong. Being honest in this context, does not preclude questions oriented towards unconscious or conscious deception (see Section 5.4.1.5).

Students’ awareness of the knowledge levels of peers affected interaction. In the statement below, the student drew upon the understanding that fellow students had or experienced similar problems.

*And even with amongst the students I felt that students felt freer. It was like it broke the ice. You engage and then you realize everybody has got certain areas they don’t understand or they have similar answers to the people in the class and it almost kind of just broke that initial anxiety (A. 85).*

This significance of the statement is that DFAQ revealed that both information seekers and givers were at the same level of understanding. This meant that students used the knowledge they had to de-construct and construct new knowledge. The result of this process was knowledge acquisition.

### 5.6.1.2 Student mobilization of resources

In this section, I analyse the mobilization of resources. I have already described DFAQ as a materials resource and will not repeat the discussion here. The focus of this analysis is on how DFAQ artefacts (questions and responses) were mobilised by students.

One of the concerns of knowledge sharing among students is that students are novices and information they share could be inaccurate. My argument is that inaccurate information is useful therapeutic knowledge (see Section 5.4.3.3). In the statement below, the student’s experience was that access to fellow students’ wrong answers was useful.

*...for me personally I like to have a wider knowledge and I want to see the wrong answers as well because I see it a certain way, so I like the active engagement so that you have actually accumulated knowledge... because you could see yourself being forced to re-shift things because you were being exposed to different knowledge (A.67).*

According to the statement, reading wrong answers had the impact meaning that the student was “to re-shift things” due to different perspectives. The student mobilized the resource of fellow student responses for strategic reasons. The responses posted in the DFAQ were not *ad hoc* as the next statement confirms.

*Also you were not put under pressure for immediate response, you could actually think it through and kind of give the response you wanted as opposed to thinking afterwards, “O I could have said that”, you actually have time and you could go back, that is the very nice thing, and you can when you think of something you can actually go back and I find that even what was quite nice was that students, I found that we as students did not have that much interaction but once were engaged on site there was a lot of interaction going on – you start and it takes the fear that you are the only one out there that does not understand and you start realizing that actually there is a lot of similar questions and I just found afterwards for me that I spent more time with students than before (A. 68).*

The back and forth interaction suggests the recursiveness of the knowledge acquisition process. Students posted questions, responded to questions, read other questions with responses, questioned the responses, etc. This process is indicative of a mobilization of DFAQ resources to achieve intended objectives. A student who mobilized the resources to write an assignment gives a typical example.

*If I just go back to equilibration, there were many responses to this because the questions were put differently but you come out to the same question at the end of the day and when I had to do my task for equilibration, I went on line and I found these questions, so it just sort of helped me when I did the assignment, the way other people put it. English is not my first language so it is nice to see how other people put it, the words they use, their vocabulary (A. 72).*

In the above statement, DFAQ served as a tool for both writing an assignment and learning English. Teaching English is an unintended consequence of the DFAQ environment. For most students in the course, English was either the second or the third language. Both the medium of instruction and the reading materials were in English. Students mobilized resources in different ways to achieve different objectives.

### 5.6.1.3 Student legitimacy of interaction

In this section, I will analyse the impact of the 'ordered' form of social life on knowledge sharing. Jones and Karsten (2003) put it this way, "... some of the seeds of change is there in every act which contributes towards the reproduction of any 'ordered' form of social life". I will identify some the *seeds of change* identified in this research.

It is the norm that conventional education is time and space bound. Courses are limited to time (e.g. semesters) and lecture sessions are time and location bound. The effect of these norms is that formal knowledge sharing has tended to be constrained. The statement below suggests that DFAQ mediated interaction changed the norm.

*You asked whatever you wanted because you haven't got a time limit, where the lecture's going to end now and you're not going to waste time, and you haven't got twenty sets of eyes looking at you, scrutinizing you when you ask, and you haven't got people being impatient with you now wasting their time, and you haven't got all those sort-of social baggage that goes with it (A.34).*

I infer from the above statement that students may not ask questions in a face-to-face session because of consciousness of the time. The asynchronous nature of the DFAQ environment allowed asking questions and responding at the convenience of the student. The anonymity ensured that there were "*no eyes looking at you*". The other issue of significance in the statement is the reference to "*all those sort-of social baggage that goes with it.*" This suggests classroom discussion brings to an interaction social baggage, which affects how they communicate with others. The social baggage seems not to have inhibited DFAQ mediated interaction as suggested below.

*"And it was really comforting to see that you could all ask what needed asking, you know. Especially on a post-grad level where you feel like you should know stuff, you know. I just felt that this way, I got onto a level higher, if somebody had said to me, if someone had shown me the texts, I would've never registered for the course." (A.35)*

In the next statement, the student reflects on his/her experience in other courses. The established norm, according to the statement, is the passive nature of learning.

*"And I really feel like, for the first time, I'm paying fees for something that I'm really getting. You know? I've really learnt... the difference between this and any other course is that you actually go out there and you do something with it... It's not a book you go and pack away on your shelf." (A.39)*

Although the student does not elaborate on the term "I've really learnt", the statement could refer to: a) expansion of horizons or worldviews due to exposure to collective thoughts b) successful accomplishment of personal learning goals. The book metaphor of DFAQ suggests dynamic interaction, "go out there and you do something with it" as opposed to static "pack away on your shelf".

The rest of this section is that of Ng'ambi (2004). The symbols used are consistent with Section 2.7.1.2 Chapter 2 i.e. [S] for Signification; [D] for Domination; [L] for Legitimation.

#### **5.6.1.4 Analysis of Signification [S]**

The statement below suggests that as a student interacts with other students, their worldview is continuously being changed.

[S] ...the more you're changing, 'because you're constantly having reflect, it's that thing that I said with the Rubic Cube, where you constantly have to look at it in different ways (A. 5).

Implied by the statement is that the change had an influence on how the student asked and responded to questions in future.

Some students found time to study over the weekend but could not have access to teaching staff for consultation:

*...like weekends are basically the only time that you do have to study, because you're working during the week (A. 3).*

The mental state is inconsistent or at variance with that of a lecturer who rests over the weekends and therefore inaccessible for consultation. The problem is that weekends, as the student mentions, are already loaded with other activities. Information seeking confined to time. Some students felt intimidated to ask questions in face-to-face session as student points out:

*...if I didn't understand something, you just shut off; it's easier. Because you can just hide behind a class of twenty, you know what I mean, if you don't understand, you just keep very quiet, you know; nobody knows (A. 4).*

The word "hide" implies two things, a) hiding ignorance from the teacher who would as well help a student, b) hiding ignorance from fellow students hence giving an "all is well" impression.

#### 5.6.1.5 Analysis of Domination [D]

Paying of fees may also lead to students mobilizing resources among themselves to do something about their lack of contact with a lecturer.

*And you need access to the lecturer; and a lot of the time, it's not necessarily that you have to see them in person; it's to discuss something with them (A. 1)*

This suggests that students would be inclined to want to support each other so as to maximise returns on their investment.

Lurking in the DFAQ environment was another resource mobilization strategy. In this strategy, students do not ask question but rather read other peoples' contributions and in the process get their questions answered.

*...looking at other people's questions. A lot of mine were answered by looking at how other people think. 'Cause you immediately get things mirrored (A. 4).*

Although no one explicitly stated their reasons for exchanging information, students strategically used DFAQ to help them pass exams. Ng'ambi and Hardman (2004) report "...three members of the class furnished DFAQ responses in the module's examination. While we are not yet able to make any firm claims about this environment's efficacy, the learners' ability to appropriate other learners' responses into their examination answers certainly suggests that this environment has potential as a learning resource" (p. 192). The experience of one student was:

*The site played a very big part in being able to get marks in the 70's, at the end of it, even though I didn't have the most enormous amount of time (A. 6)*

While DFAQ artefacts are collective memories, users retrieved individual memories to help them gauge growth over time.

*You can go back and review things once you've had a lecture and actually see, what is it that I understand now, and how was I thinking (A. 7)*

The student speaks of having power to decide when to access resources, using DFAQ as a dynamic organizational memory system from which learning from previous messages is possible.

#### **5.6.1.6 Analysis of Legitimation [L]**

There seem to have been an association between students' payment of fees and expectation of contact time with a lecturer as this student asserts:

*...so it seems almost ludicrous in a way to be paying those fees when you're not sitting in a class (A. 1)*

This expectation may mean that students would be inclined to want to receive information rather than give, as this consistent with the principle of paying for services or buying a product. Some students preferred to consult with lecturers than with fellow students.

*...on the days that I did see X (name of lecturer), I've had to dash back and forth (A. 2)*

Some of the reasons for consulting with the lecturer were because students felt they had paid for the time in fees.

*...if we are paying close to X fees a year, which is a lot of money, and we... if you look at the amount of time that we actually spend in class with the lecturer, it's not relative, it's not relative to what we're paying (A. 8)*

The perception of the student was that fees translate into contact hours with the lecturer. The lack of contact motivated students to want to share information with peers.

### **5.6.2 Discussion**

In this section, I have used the Structuration Theory lenses to analyse computer-mediated human action. In particular, I have analysed the duality of structure, student understanding and its exhibition, student mobilization of resources and student legitimacy of interaction. The analysis has shown that students acted out what they thought. For instance, fear of ridicule, fear of looking stupid, tended to lead to passive engagement. Although the interaction was anonymous the fact that students still referred to these issues, suggests that students were still conscious of these social *structures*. This addresses the research question 1.3.1: *How does anonymous computer mediated interaction influence the question knowledge acquisition among students?* and 1.3.6: *To what extent is the need for information satisfied through questions and responses?*

## **5.7 Concluding remarks**

In this chapter, empirical materials discussed in the previous chapter have been analysed using the CDA-GST framework described in Chapter 3. In Chapter 2, I discussed the CDA-GST analytical framework underpinned by various theoretical lenses *viz.* theories of text, theories of human interaction and human action. I have already mentioned that DFAQ is both a medium of communication and an outcome of interaction. Students used DFAQ as a social space, a communication space and as an educative space. DFAQ mediated interaction is text-based. Both the text-based and asynchronous nature of DFAQ allowed messages to persist. I have used the Speech Act Theory to analyse the



characteristics of questions posted. In Section 5.4, I showed that some questions were oriented towards understanding while others towards deception. Therapeutic and aesthetic questions could be useful for diagnosing misunderstanding and preconceptions. In Section 5.4.2, I showed the types of knowledge embodied in questions; this could be useful information for educators. I used the Semantic Networks in Section 5.4.3, to show that the focus of questions do change over time, because information needs to change. The analysis of computer-mediated interaction was in terms of the effect of anonymous communication, text-based communication, and access to shared knowledge on learning. I then used Structuration Theory to analyse human action. I showed students tended to interact in ways that aligned with what they believed. For example, those who felt that the DFAQ was a “safe” environment may have been more active.

In the next chapter, I will review the research questions.

Chapter 6

REVIEW OF RESEARCH QUESTIONS

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## **6.1 Introduction**

The purpose of this research was to investigate the phenomenon of informal knowledge sharing among students. I particularly sought to answer the research questions posed in Chapter 1. The subsequent chapters were devoted to addressing the questions. In Chapter 2, I discussed the theoretical lenses I was using to understand the phenomenon. In Chapter 3, I discussed the research approach for answering the questions. In Chapter 4, I detailed the gathering process of empirical materials. In Chapter 5, I drew the connections between the theoretical lenses and the research approach to analyse the empirical materials. In this chapter, I review the extent to which the study addresses the research questions.

The chapter is in two parts. Part 1 (Section 6.2) is a review of the problem statement described in Chapter 1 and Part 2 (Section 6.3) reviews the research questions.

## **6.2 Review of problem statement**

### ***6.2.1 The problem of access to knowledgeable peers***

Access to knowledgeable peers was through the text messages posted in the DFAQ environment. The asynchronous text-based communication (see Section 5.5.2) allowed messages to be accessible at the convenience of a student. Students not only asked questions and received responses, but read questions asked by peers and contributed responses. The questions represented needs for information and that DFAQ was a communication space (see Section 5.3.3) through which information seekers accessed information givers.

### **6.2.2 The problem of access to shared knowledge**

The asynchronous nature of DFAQ mediated knowledge sharing allowed students to access a deluge of contributions from peers. DFAQ was both a medium of interaction (see Section 5.3.1 and 5.3.3) and an outcome of interaction (see Section 5.3.2). The outcome was a knowledge resource based on informal consultation. DFAQ provided students with access to shared knowledge (see Section 5.3.2 and 5.5.3).

### **6.2.3 The problem of access to “mental structures”**

Knowledge is not an outcome of the mind that is detached from everyday concerns but is an outcome of human activity that is motivated by needs and interests. Students constructed their own knowledge through computer-mediated interaction with peers. DFAQ facilitated the construction and de-construction of knowledge (see Section 5.5.3). Acquisition of new knowledge involves the construction and de-construction of prior knowledge. The knowledge students shared with one another was *ex nihilo nihil fit* but was an outcome of prior knowledge. Although the research shows that DFAQ had a *rubic cube effect* and made students think (see Section 5.3.2), the study is inconclusive on the direct access to “mental structures”. The study, however, shows that anonymous computer-mediated questioning influences knowledge acquisition.

## **6.3 Review of Research Questions**

### **6.3.1 How does anonymous computer-mediated interaction influence the question-driven knowledge acquisition among students?**

DFAQ preserved messages while concealing the identity of the authors. The interpretation of text with a known author is different to interpretation of similar text where the author is *incognito*. Although DFAQ concealed identities of authors of questions and responses, students knew that authors were fellow students in the course. The effect of this approach

to anonymity (see Section 5.5.3) was that DFAQ postings were tailored to the needs of participating students, postings had immediate use (“a food metaphor”) and were at a level that students could understand. In this regard, my discussion of effects of anonymous computer-mediated interaction is in the context of DFAQ. Anonymity was not an option given to DFAQ users but was a feature of DFAQ environment. Students were conscious that the interaction was anonymous and this created a feeling of safety, which encouraged participation from all participants. Section 5.5.1 shows that students drew upon *anonymity* as a resource to ask questions they would otherwise not for fear of being associated with asking “stupid” questions. Students focused on the content of messages and not on the sources. This aligns with Gadamer (1975) who asserts, “...a person who seeks to understand must question what lies behind what is said”. Anonymity allowed students to focus on questions and students became confident to share the “little bit” of their knowledge with peers (see Section 5.5.1).

### **6.3.2 Can student-to-student consultation dialogue persist beyond a consultation session?**

The DFAQ as a medium of communication (see Section 5.3.3) facilitated student-to-student consultation. Students transformed their information needs into ostensive messages (questions) and posted them in the DFAQ environment. The messages were meaningless until interpreted. DFAQ facilitated two types of communication: *interaction* in which a source transmits a message to a receiver (see Section 5.3.1) and *transaction* in which messages carry meaning (see Section 5.3.2). Students had access to the text messages posted in the DFAQ from all participants (see Section 5.5.2). The shared knowledge had an effect on student learning (see Section 5.5.3). DFAQ served as an educative space (see Section 5.3.2). The study shows that consultation dialogue persisted beyond a consultation session.

### **6.3.3 *In what ways can persistent student-to-student dialogue influence learning and teaching?***

The DFAQ artefacts are an outcome of student-to-student dialogue. To this end, DFAQ artefacts are evidence of persistent consultation dialogue and the analysis of DFAQ from an educative perspective (see Section 5.3.2) shows its influence on learning. The effects on learning include recruiting students' attention; focusing students on tasks; allowing students to reflect on their learning; cognitively shifting students' thinking. Other influences include (see Section 5.5.2): pre-emptive effect; mirror effect; and grappling hooks effect (see Section 5.5.2). Ng'ambi and Hardman (2004) report that "three members of the class furnished DFAQ responses in the module's examination. While we are not yet able to make any firm claims about this environment's efficacy, the learners' ability to appropriate other learners' responses into their examination answers certainly suggests that this environment has potential as a learning resource (p. 192).

### **6.3.4 *What can educators learn about students from students' questioning patterns?***

The study shows that educators can use student questions to diagnose knowledge. Mao and Benbasat (2000) contend "...questions arise from knowledge rather than ignorance" (p. 159). This research has shown that acquisition of new knowledge is a process of deconstruction and construction of prior knowledge. DFAQ provided a space in which students engaged in a continuous knowledge de-construction process (see Section 5.5.3). Therefore, DFAQ artefacts are an outcome of an informal process of constructing and de-constructing knowledge. The questioning patterns (see Section 5.4) show the following traits: simple 'yes' 'no' questions; therapeutics and aesthetic questions; questions oriented towards understanding; questions oriented towards deception; questions with a response guide; and complex questions. These traits show that questions indicate the level of student knowledge. The educators may use the information to develop suitable and timely interventions to assist struggling students.

### **6.3.5     *What is the impact of anonymous student-to-student consultation on student questioning and responding to questions?***

DFAQ not only recruited student attention (see Section 5.3.2) but actively engaged students both online and offline. Students went away from the DFAQ environment to think and research the questions before returning with responses (see Section 5.5.3). DFAQ modelled appropriate behaviour of students in the following ways: self-paced their learning (see Section 5.3.2); and allowed students access to questions they would otherwise not ask themselves (see Section 5.5.2).

### **6.3.6     *To what extent are students able to express their need for information and to what extent is the need for information satisfied through questions and responses?***

The pre-emptive effect of DFAQ artefacts (see Section 5.5.2) suggest that some information needs were satisfied before students expressed them. This pre-emptive effect occurred through student exposure to a deluge of questions and responses from peers. To the extent that students posted “silly” questions (see Section 5.3.3); asked questions oriented towards deception (see Section 5.4.1.5); contributed the “little-bit” they knew (see Section 5.5.1) suggest that students expressed their need for information. Students also tended to deliberately hold back from giving information (see Section 5.6.13) because they felt their role as students was to receive and not to give information.

### **6.3.7     *What is the nature of questioning dialogue that happens during student-to-student consultation?***

There are four types of questioning dialogue (see Section 5.4.2): technically and strategically oriented; empirical-theoretical oriented; moral-practical oriented; and aesthetic-practical oriented. Questioning dialogue is how students ask questions to acquire and use knowledge (see Section 2.5.3). Students did ask questions that embodied technically and

strategically useful information (see Section 5.4.2.1). This type of questions model knowledge transmitted through technologies. Thus, questions of this type would serve as useful knowledge resource. Empirical-theoretical questions use subjective statements or phrases and therefore useful for discussion (see Section 5.4.2.2). The value of these type of questions is that they led to developing theories. The moral-practical types of questions use statements that are 'personal' usually making legal or moral claims. The questions lead to practical discourse. Finally, the aesthetic and practical questions often modelled on the knowledge from the "works of art". These questions use statements that reveal the state of the author. The questions are self-representing. These questions usually confess things like *confusion, understanding, lost, interested, etc.* The questions serve as useful resources for diagnosing misunderstanding and misconceptions.

## 6.4 Concluding remarks

In this chapter, I have appropriated the analysis and discussion of empirical materials discussed in Chapter 5 to answering the research questions. The research shows that anonymity was not only a feature of DFAQ but also a resource that students drew upon for knowledge sharing. The study has shown that the social context of students did influence knowledge sharing. One of the effects of DFAQ was its influence on student learning. Although, I do not have evidence on the efficacy of DFAQ on student performance I draw the following impressions: Firstly, the widening of access to knowledgeable peers may have given students access to a deluge of consulting peers. Secondly, access to questions and responses from other students may have given students access to an invaluable resource. These two factors may have had an effect on student learning.

The research has shown that informal knowledge sharing among students could be a useful diagnostic resource for teachers. However, this is only realisable when students feel safe to ask questions that they may even consider being "silly" or "basic".

In the next chapter, I will review and evaluate the research process in detail and conclude.



## Chapter 7

## EVALUATION OF RESEARCH AND CONCLUSION

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## **7.1 Introduction**

The purpose of this chapter is to evaluate the research process, review the contributions of this work, potential areas for further research, and implications of the study. I begin the chapter with a review of the research process using Klein and Myers' seven principles of interpretive research. I will discuss the contribution in terms of practical and theoretical contributions. The study has implications to student's problem of informal knowledge sharing and to IS practitioners. In the last part of the chapter, I will review my journey as a researcher and conclude.

## **7.2 Review of the research process using Klein and Myers' Seven Principles of Interpretive Research**

The objective of interpretive research is to understand "the basis and source of social reality through delving into the depth of human consciousness and subjectivity" (Burrell and Morgan, 1979). This research delved into the social reality of anonymous computer mediated informal knowledge sharing among students. Although the interpretive paradigm has been used in social science research, it is "new in IS research" (Vessey *et al.*, 2002). Klein and Myers (1999) contend that "Interpretive research can help IS researchers to understand human thought and action in social and organizational contexts; it has the potential to produce deep insights into information systems phenomena including the management of information systems and information systems development" (p. 67). In this research, I investigated the phenomenon of informal knowledge sharing from "the standpoint of the social world of students" (Garrick, 2000:209).

The increasing interest among IS researchers in Interpretive Research has led to "researchers, reviewers, and editors to raise questions about how interpretive field research should be conducted and how its quality can be assessed" Klein and Myers (1999). The set of principles for the conduct and evaluation of interpretive research in Information Systems is Klein and Myers' response to these questions. The seven principles are summarised in Figure 7.1.

	Principle	Description
1	The Fundamental Principle of the Hermeneutic Circle	This principle suggests that all human understanding is achieved by iterating between considering the interdependent meaning of parts and the whole that they form. This principle of human understanding is fundamental to all the other principles.
2	The Principle of Contextualization	Requires Critical reflection of the social and historical background of the research setting, so that the intended audience can see how the current situation under investigation emerged.
3	The Principle of Interacting Between the Researchers and the Subjects	Requires critical reflection on how the research materials (or “data”) were socially constructed through the interaction between the researcher and participants.
4	The Principle of Abstraction and Generalization	Requires relating the idiographic details revealed by the data interpretation through the application of principles one and two to theoretical, general concepts that describe the nature of human understanding and social action.
5	The Principle of Dialogical Reasoning	Requires sensitivity to possible contradictions between the theoretical preconceptions guiding the research design and actual findings (“the story which the data tell”) with subsequent cycles of revision.
6	The Principle of Multiple Interpretations	Requires sensitivity to possible differences in interpretations among the participants as are typically expressed in multiple narratives or stories of the same sequence or events under study. Similar to multiple witness accounts even if all tell it as they saw it.
7	The Principle of Suspicion	Requires sensitivity to possible “biases” and systematic “distortions” in the narratives collected from participants.

Figure 7.1: Summary of Principles of Interpretive Field Research (Adapted from: Klein and Myers, 1999:72)

I will now review my research process using each of the seven principles.

### 7.2.1 The Fundamental Principle of the Hermeneutic Circle

The hermeneutic rule states, “...we must understand the whole in terms of the detail and the detail in terms of the whole” (Gadamer, 1975: 258). This rule suggests a circular relationship between the detail and the whole. I infer from the hermeneutic rule that we understand details, such as discourse (text), in a broad social context of interacting human agents. It also follows that no understanding of social context is possible without understanding the details. I use the word *understand* to mean derivation of meaning as

Gadamer (1975) rightly put it, “the anticipation of meaning in which the whole is envisaged becomes explicit understanding in that the parts are determined by the whole, themselves also determine this whole” (p. 259). Gadamer’s thesis of recursion is that the whole determines the part, the part determines the whole, which is similar to Giddens’ theory of duality of structure where the structure determines human actions, and human actions determine structure.

The recursive nature of structure and actions, premises Giddens’ argument that structure enables and constrains human actions. According to Giddens (1979:70) “the same structural characteristics participate in the subject (the actor) as in the object (society). In this study, details (text) are an outcome of computer mediated social interaction. Individual students posted questions and received responses from peers and these messages or artefacts constituted a knowledge resource.

Thus, the study involved iterating between analysis of interdependent meaning of DFAQ artefacts and the social context of production of artefacts. I have therefore applied the principle of Hermeneutic Circle to the study.

### **7.2.2 The Principle of Contextualization**

The socio-historical background of the research setting is pointed out in (Hardman and Ng’ambi, 2003) who note, “This research arose as a response to academic underachievement by students. Anecdotal evidence indicates that some of these learners are unable to read actively. In other words, these learners appear unable to appreciate their role as active cognising agents engaged in constructing meaning from text.” (p. 139). This problem is particularly serious within a University where students have to deal with academic readings for which critical questioning skills are essentially vital. In the new post-apartheid South Africa, an increasing number of previously disadvantaged students are entering previously *whites-only* Universities. “As a consequence of South Africa’s tumultuous history, learners at UCT come from diverse educational backgrounds and have different learning needs” (Ng’ambi and Hardman, 2004: 188). For most of these learners, prior schooling did not prepare them for the critical demand of University academic texts. Consequently, as Hardman and Ng’ambi (2003) point out, “these learners approach University ill-structured problems in the same way as they would approach puzzle-like problems, as problems that have a single, knowable answer, which once found, can close

further enquiry” (p. 140). In view of the challenges that University tasks present to ill-prepared students, and despite the formal remedial programmes of the University, students have developed a culture of informally helping one another. This study has focused on the latter. There are two problems identified in this phenomenon:

- a) Consultations were limited within clusters of friends and not based on asking knowledgeable peers but those that a student was comfortable with (Ng’ambi, 2003:293).
- b) There was no way an educator would know the type of knowledge informally exchanged between students.

I will briefly review these problems:

- a) Consultation was limited to clusters of friends and not necessarily to knowledgeable peers

Some of the factors that influenced the formation of clusters include shared background; histories; personality; class; etc., none of which had to do with skills or knowledge. This meant that learners privileged to have intelligent friends had advantage over those who did not. There was need to address the problem of access to knowledgeable peers.

- b) There was no way an educator would know the type of knowledge informally exchanged between students.

Information shared informally, no matter how valuable, would not persist beyond a consultation session and was lost. In Ng’ambi (2003), I observe that:

*...the problem with this temporality of consultation instances is that valuable knowledge that is exchanged during consultation sessions is lost and learners with questions / problems continue being deprived of knowledgeable peers because they have no way of knowing which user knows the answer to specific problems (p. 293).*

Addressing the problem of “persistence” of consultation sessions would not only provide diagnostic information but would result in a knowledge sharing resource for the benefit of a community of learners.

The research, thus, identified and addressed practical problems as (Ng’ambi, 2002a) reports:

*Our findings in this project show that using peers to interpret and question responses from their counterparts (peers) helped in creating a critical questioning environment for academic text. The use of questions as a teaching tool allows for easy identification of where learners are ‘coming from’ hence creating an earlier understanding of misconceptions and misunderstanding they bring to the course (p. 282).*

The student statement below captures the diagnostic goal of the research:

*But this is almost like having a window on the student’s brain and their development, as such. So if they login on different levels, you actually have got a window on their development; you can actually see where they’re going (A. 25).*

To the extent that the study has taken a critical reflection on student questions and computer-mediated interaction for under prepared students, the principle of contextualisation is applied.

### **7.2.3 The Principle of Interaction between the Researchers and the Subjects**

I have mentioned that this research was in response to academic underachievement by students. The learners informally consulted one another but the consultation suffered severe limitations. Despite the limitations, students preferred to consult informally because they felt *safe* with peers rather than consulting an educator. It was impractical to observe informal consultations. The approach taken was to design and implement a consultation environment (DFAQ) in which interaction was both anonymous and asynchronous. In other words, anonymity shifted attention from physical cluster members to *knowledge clusters*. Anonymity created the desired *safety* and *asynchronosity* allowed students to self-pace and model interactive behaviour with peers.

The case study was located in an honours course in which all students were working full time and studying part time. The DFAQ captured artefacts of consultation (questions and responses). The interaction between the researcher and the students was therefore two fold: a) through the DFAQ as a surrogate; b) unstructured focus group discussion and interview of students on their experience.

### 7.2.4 The Principle of Abstraction and Generalization

The purpose of this principle is to relate “the idiographic details revealed by the data interpretation through the application of the first and second principles to theoretical, general concepts that describe the nature of human understanding and social action” (Klein and Myers, 1999:72). I used the CDA-GST framework to frame the research and guide the investigation. Fundamental to CDA-GST framework are the dimensions of text (DFAQ artefacts); DFAQ mediated interaction; discourse practices; and social-cultural practice. Figure 7.2 depicts CDA-GST dimensions.

CDA-GST Knowledge Sharing Framework	Research Abstraction Framework	
	Three Dimensions of CDA	Theoretical Underpinnings
	<i>CDA oscillates between the production and interpretation of text; and Social conditions of production and interpretation of text.</i>	
	a) <b>Text</b>  <i>Artefacts of DFAQ as digital artefacts arising from computer mediated interaction</i>	Speech Act Theory (SAT) (Searle, 1979; Habermas, 1984) <i>SAT used to analyse speech acts</i>  Semantic Networks (SN) (Simmons, 1973) <i>SN used to analyse ‘deep structures’, underlying artefacts</i>
	b) <b>Discourse practice</b> (text production and text interpretation)  <i>Experience of human agents in the production and interpretation of artefacts</i>	Theory of Communicative Action (CA) (Habermas, 1991:135)  <i>CA used to recast a student as both initiator and product of transitions surrounding him.</i>
	c) <b>Socio-Cultural practice</b>  <i>DFAQ (as a dynamic digital genre) is a social system produced as transactions (informal consultation) between agents.</i>	Giddens’ Structuration Theory (GST) (Giddens, 1979:81)  <i>GST lenses used to “see” the modalities of structuration drawn upon by students in the production of interaction, and as media of the reproduction of the structural components of systems of interaction.</i>

Figure 7.2: Research Abstraction of CDA-GST Framework

### 7.2.5 The Principle of Dialogical Reasoning

“The principle of dialogical reasoning requires the researcher to confront his or her preconceptions (prejudices) that guided the original research design (i.e., the original lenses) with the data that emerged through the research process” Klein and Myers (1999:76). I will highlight some of the social contradictions between the theoretical preconceptions and actual findings. Social contradiction is “an opposition or disjunction of structural principles of social systems, where those principles operate in terms of each other but at the same time contravene one another” (Giddens, 1979:141). I need to stress that contradiction is not to be confused with conflict. The difference is that conflict, as Giddens (1979) put it, “is about the struggle between actors or collectivities expressed as definite social practices” (p. 131) whereas contradiction is “bound up with the finitude of being, and hence with the pervasiveness of becoming” (p. 132). I infer from Giddens’ that contradictions are high-level structures, which shape human interaction. The relationship between contradictions and human actions is emphasised by (Giddens, 1979):

*Human beings exist in contradictory relation to nature because they are in and of nature, as corporeal beings existing in material environments; and yet at the same time they are set off against nature, as having a ‘second nature’ of their own, irreducible to physical objects or events (p. 161).*

In view of the above arguments, I present contradictions between theoretical preconceptions and actual findings.

Concept	Preconceptions	Actual Findings
Hermeneutics (Gadamer, 1975: 349)	Text (questions) are permanently fixed expressions of life’ which have to be understood, and that means one partner in the hermeneutic conversation, the text, is expressed only through another partner, the interpreter. Only through him are the written marks changed back into meaning.	Although questions <i>persisted</i> they were not regarded a <i>fixed expressions of life</i> [see Section 5.4.1.2]. Meanings changed when context changed. This aligns with Giddens (1979) who argues: “...a text is not to be regarded as a ‘fixed form’, which is then somehow related <i>en bloc</i> to particular intentions; it should be studied as the concrete medium and outcome of a process of production, reflexively monitoring by its author or reader” (p. 43).



Theory of message interpretation (Heidegger, 1962:88)	Interpretation of messages is not the acquisition of information about <i>what is understood</i> , it is the working-out of possibilities projected in understanding.	Knowledge sharing is a process of de-constructing and constructing knowledge [see Section 5.5.3], which suggest acquisition of information from understanding.
Discourse Instance (Fairclough, 1992:10)	Every discourse instance has three dimensions: it is a spoken or written language text; it is an interaction between people, involving processes of producing and interpreting the text; it is part of a piece of social action.	A medium of interaction (e.g. DFAQ) is a fourth dimension [see Section 5.3] and influences interaction [see Section 5.5]. This is consistent with Wynn <i>et al.</i> (2002) who observe, "Communication using technological support or computer mediated communication can have an influence on validity claims" (p. 98).

Figure 7.3: Contradictions between theoretical preconceptions

### 7.2.6 The Principle of Multiple Interpretations

The aim of this principle is to highlight some of the differences in the way students "told their story" having experienced the same sequence of events under study. I had thought that anonymity was going to create an environment in which students would be confident to seek and give information but some students had different experiences. For example, while anonymity allowed students to interact with confidence, it took away confidence for this student:

*Sometimes I find two responses to the same questions and sometimes two different responses and depending how much I know about the topic I would then see – well this one did not come from X, but not always (A.71).*

The above statement is indicative of the fact that anonymity may not have shifted some students to begin appreciating their role as active cognitive agents engaged in constructing meaning from text. Although anonymity had positive effect on information sharing, some students had less confidence in the messages because they did not know the sources. However, the student reported that anonymity enabled her to overcome the lack of confidence: "I was not sure if I was giving the correct response" (A.108.2). In a face-to-face interaction, she would have stayed quiet:

*...where you don't have the confidence to speak up in front of other people and you always find them in your classes and wherever you go so it will be good for them as well (A. 92).*

There was another interpretation of the effect of anonymity as shown by the statement below:

*...for me you all have the same goal as opposed to thinking I don't really know that person, it is just more honest and it becomes more task specific or subject specific, you cut to the chase, there is no airs and graces and nobody gets offended (A.74).*

The perception of the student was that anonymity allowed her to focus on the task as opposed to focusing on originators of messages. According to the statement, anonymity created an "honest" environment by removing the deceptive gain of pretending to know when in fact it was not the case.

Students had different views on how they experienced exposure to other people's questions. In the statement below, the student reports:

*Whereas, with this (DFAQ), you could actually, for me, one of my biggest learning curves was, um, looking at other people's questions. A lot of mine were answered by looking at how other people think. 'Cause you immediately get things mirrored (A.4).*

The statement postulates that looking at other people's questions was a learning experience. The exposure to other questions had a pre-emptive effect in that questions mirrored the student thinking. According to the student, some of her information needs that she may not have been discursively conscious of were satisfied. While the above student experienced a pre-emptive effect, others report on a *changing effect*.

*And then, the more you read other students' questions, the more you're changing, 'because you constantly have to reflect (A. 5).*

The use of the word "changing" here means a shifting mental position that is a process of learning. This changing effect suggests that DFAQ had a cognitive effect on students. Other students experienced an emancipation effect as this student narrates:

*Once you looked at everybody else's questions, you felt freed up to actually ask, and to say to one-another, you know, what about this, and ask one-another questions, you know, and not have the fear of, I've got completely the wrong tail-end (A.11).*

Finally, other students experienced a consolation and relief effect. In the statement below the student reports that exposure to others' questions was a source of relief:

*...and then, going back and looking at some of the other students' questions, just having this absolute relief of... we're all in the same boat (A.10).*

### **7.2.7 The Principle of Suspicion**

The principle of suspicion requires researcher to be sensitive to possible biases and systematic distortions in the narrative collected from participants. However, Klein and Myers (1999) observe that: the application of the principle of suspicion appears to be one of the least developed in the IS research literature. However, since there is considerable disagreement among interpretative researchers concerning the extent to which social research can (or should be) critical, we leave open the possibility that some interpretive researchers may choose not to follow this principle (p. 78). Nevertheless, I have applied the principle of suspicion.

DFAQ mediated knowledge sharing is similar to seeking advice from peers in that the information seeker needed to evaluate the information and decide whether she agreed with the opinions received. However, the DFAQ environment allowed students to rate questions and responses as Ng'ambi and Hardman (2004) observe:

*...the lecturer did not directly reward questions and responses online, but good answers and questions were rewarded in two ways. First, the environment provides a facility for learners and lecturer to rate a particular response as 'very good', 'good', 'poor' or 'very poor'. Learners could see these ratings and tell at a glance what qualified as a 'good' versus a 'poor' response, in the eyes of their peers and the lecturer. Second, the lecturer selected good questions and responses for discussion during the face-to-face lectures (p. 192).*

The following statement made me suspicious about the extent to which the DFAQ interaction was anonymous.

*One time we logged in I had one of the students sitting next to me, and he said to me, "Go and rate my question. I want a rating now." And I mean we were joking, wanting to "rate" one-another's questions! But it, in a way it was very true; because you wanted to know what your peers were thinking, because that is somebody that is on the same level as you. You are very much shaped by your peers, and what people are thinking and how they view it. And I know for me personally, that was a big thing (A. 18).*

In the above statement, the student argues the importance of peer affirmation. In the DFAQ environment, interaction was anonymous. It therefore seems odd that for a student to ask for rating in an environment where postings cannot be linked to particular sources.

I was also suspicious that not all questions received responses from peers. This was not necessarily the case, as this student reports:

*A lot of the questions were answered but not all of them, that was the only problem I had but I could go and look at other students' similar questions that had been answered or even have my questions answered by questions, have the realization of what it is that I was missing. So what I did when we logged into the site again was to actually go to those questions that had not been answered and just to look at other students answers to those questions (A. 62).*

In the statement, the student describes how she found responses to unanswered questions through reading answers to other questions. This suggests that, although students may have phrased the questions differently, they had similar needs for information.

In this section, I have assessed and evaluated the research process using Klein and Myer's Seven Principles of Interpretive Research. In the next two sections, I will review the contribution of this work in terms of practical and theoretical contributions.

## 7.3 Practical Contributions

DFAQ is a special purpose computer mediated communication tool with a three-pronged objective: a) to extend informal knowledge sharing; b) to widen student access to knowledgeable peers; c) to create knowledge resources from communication artefacts. I will discuss each of these sub-objectives, and emphasize the practical contribution made in each case through realizing the sub-objectives.

### 7.3.1 Extension of informal knowledge sharing

The extension of informal knowledge sharing was through a special purpose asynchronous CMC tool, DFAQ. The value of this contribution, in the context of South Africa, lie in that fact that the legacy of apartheid appears to cause students to form clusters along the lines of background, culture, race, religion etc. This social clustering leads to social exclusion in that students from a previously disadvantaged background tend to limit informal consultations within clusters of social identity. The anonymous consultation through the DFAQ environment creates a safe virtual cluster for all students.

### 7.3.2 Widening of student access to knowledgeable peers

The word access, in this context, ambiguously means two things: student access to a wider consultation audience; educators' access to the "knowledge" of consulting students. Through DFAQ, individual students gain access to an audience that is normally the preserve of an educator. Traditionally, only an educator poses questions to an entire class; students direct questions at a teacher and not to fellow students. The value of this widened access to consulting peers, and knowledge of consulting students provides access to diverse knowledge, skills and experiences not previously possible. This research has shown evidence of the value of the contribution. The following statement from a student sums up the effect of DFAQ:

*...this is almost like having a window on the student's brain and their development, as such. So if they login on different levels, you actually have got a window on their development; you can actually see where they're going (A. 25).*

This suggests that there was access to the minds of the consulting students. The benefit of access to the “minds” was not limited to student experience. DFAQ created a window for the teacher to know the kind of knowledge, learning, confusion, and misunderstandings that students had. Questions and not necessarily answers provided a way of gauging the level of student knowledge and the educator used the information to develop suitable interventions.

### **7.3.3 Creation of knowledge resource from communication artefacts**

I have already alluded to the fact that DFAQ is a communication or consultation medium and a knowledge resource. The dual-purpose of DFAQ is similar to the ambiguity of the word e-mail which may mean e-mail as a communication facility or e-mail as a message sent / or received. Similarly, DFAQ facilitates informal knowledge sharing and is a dynamically created knowledge resource from informal knowledge sharing. In other words, DFAQ knowledge resource is an outcome of DFAQ mediated interaction. In the statement below, the student refers to DFAQ as a resource.

*To me as a student, what was amazing was being able to go back – those questions didn't disappear. I could actually go back and look at things. So you actually, you've got a marker, you can actually go back, and it's kind-of fitting. It's like having grappling hooks when you climb – you can actually see where you've come, and you've got something to measure by, and it's active (A. 30).*

In other words, DFAQ creates artefacts called DFAQ (knowledge resource). Put simply, if we accept that “FAQ lists are digital genres” (Antunes and Costa, 2003) then DFAQ is a dynamic digital genre. My contribution in this regard is that I have re-conceptualised traditional static digital genres (FAQ lists) into dynamic digital genres (DFAQ).

## **7.4 Theoretical Contributions**

According to Jones (2000), Giddens' Structuration Theory (GST) is one of the most widely cited social theorists in the IS literature. However, some of the critiques of GST such as Gregson (in Jones, 1999:112) argue that GST “operates at too high a level of generality to

provide guidance in specific empirical settings". The high level of generality at which GST operates makes it difficult to operationalize the theory. The need to operationalize GST has been pointed out by Jones and Karsten (2003) who observe: "the contributions of Giddens to the IS field has still not been fully put into action" (p. 44). The challenge of using GST in IS research lie in the fact IS has a material component which does not exist in organizational research, i.e. technology. Jones (1999) rightly points out that,

*...there is a particular problem for Structuralist IS research which may not be argued not to exist for organizational research, that is the material character of technology. This is not to say that technology should be understood simply as material artefacts, but that all computer-based IS have some component that has a physical existence, even if the IS itself is much more than that (p. 117).*

Despite the wide citation of GST in IS literature, the high level of generality coupled with the material component of computer-based IS, has made it difficult to operationalize GST. The consequence of these problems is a gulf between IS researchers citing GST and IS practitioner not knowing how to use the results. Jones (1999:117) cautions researchers using GST that "...those seeking to 'apply' Structuration theory in IS research are very much 'on their own'".

It is against this background that I discuss theoretical contributions. I will discuss these contributions in two sections: the Methodological Framework for Discourse Analysis and the CDA-GST Framework for analysis of text. Figure 7.4 depicts both frameworks.

#### **7.4.1 Methodological Framework for Computer-Mediated Discourse Analysis**

The framework has reconciled the theoretical tensions between the high-level view of GST, the *shortage* of clear procedures of CDA and Computer Mediated Interaction. The framework has explicitly tied the theoretical insights to concrete qualitative methods that analytically make sense of the theoretical lenses to understand the phenomenon of computer-based interaction for knowledge sharing. This contribution is therefore a response to Korobov (2001) who notes:

*...it is highly fashionable these days to embrace some version of a 'social constructionist' mantra—the idea that cultural/ social/ historical discourses play (to some degree) a constituting role in the semiotic or discursive establishment of our "realities". And further, as we practice these discourses in our everyday conversations, we in turn are perpetually re-constituting these discourses by expanding, challenging, rejecting, or re-inventing them. Many theorists craft this general, yet paradoxical sentiment vis-à-vis different theoretical movements. But, I will argue, far too few explicitly tie these theoretical insights to concrete qualitative methods that can analytically make sense of the way this theoretical paradox actually gets played out in the interactive domain (Korobov, 2001).*

Both GST and CDA share the *social constructionism* philosophy. GST argues that “...actors in the production of interaction draw upon the modalities of structuration, but at the same time are the media of the reproduction of the structural components of the systems of interaction” (Giddens, 1979:81). In CDA,

*...one never really talks about features of a text without some reference to text production and/or interpretation. Because of this overlap, the division of analytical topics between text analysis and analysis of discursive practice (and so between the analytical activities of description and interpretation) is not a sharp one (Fairclough, 1992:73).*

It follows that CDA-GST framework (Figure 7.4) is a social constructionist methodology for computer mediated discourse analysis.

#### **7.4.2 CDA-GST Framework for analysing Text**

The theories that underpin the text component of the CDA provide guidelines for the analysis of text as an outcome of computer mediated interaction. The framework uses multiple theoretical lenses (*viz.* Communication Action; Speech Act Theory; and Semantic Networks). This is a response to Meyer (2001) who observed: “...there is no guiding theoretical viewpoint that is used consistently within CDA, nor do the CDA protagonists proceed consistently from the area of theory to the field of discourse and then back to theory” (p. 18). Thus, the framework makes explicit the method, hence the guidelines, for analysing artefacts of computer mediated interaction and provides a way of proceeding from an area of theory to the field of discourse and *vice versa*.



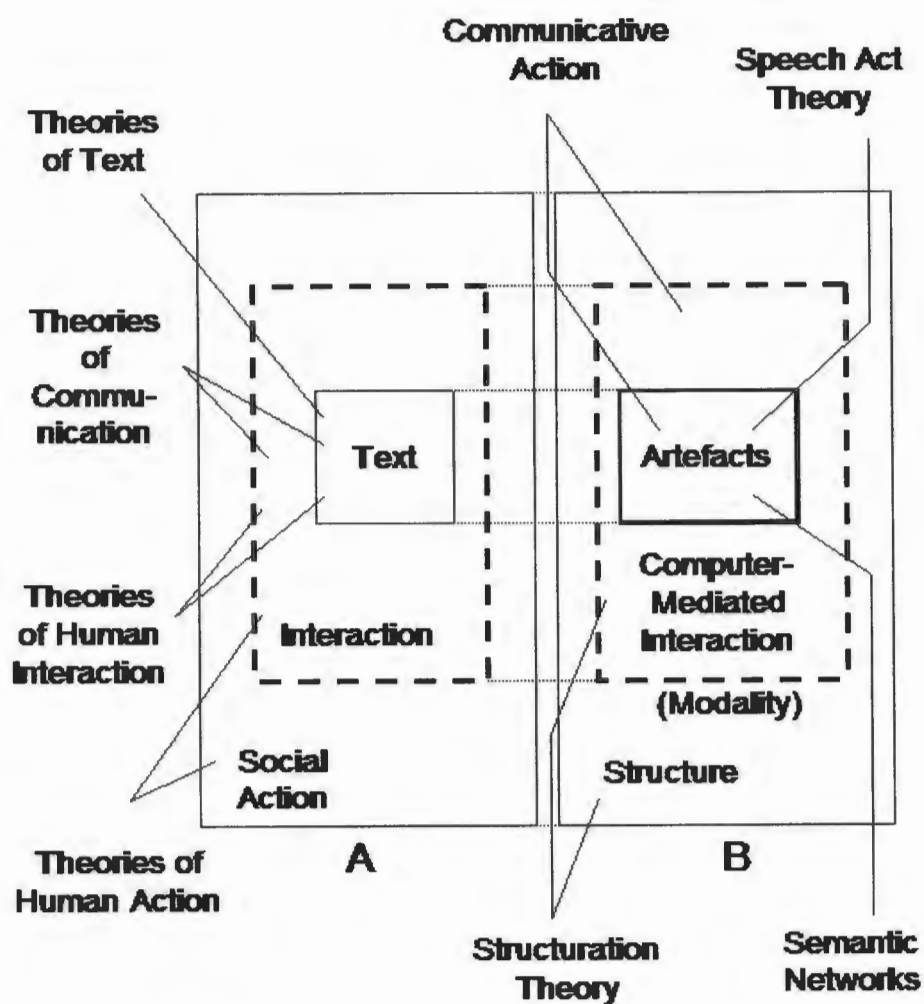


Figure 7.4: CDA-GST Framework for analysing text

## **7.5 Further Research**

This study arose from the need to solve the problem of informal knowledge sharing among students. However, the problem of information sharing among small groups is not unique to students. In some organizations, employees use help desks or consult with colleagues. Such information does not persist beyond consultation time. One of the contradictions I observed in the study was that some students felt that because they pay tuition fees they expected to receive information and not to share information. It is important to investigate whether the absence of a need to pay tuition fees such as a work place environment, could lead to greater measures of emancipation. Further research could repeat a similar study with members of an organization where participants are employees who do not have to pay fees.

The DFAQ as a communication medium extends access to a wider audience and access to the “minds” of the audience. The extension of access to a wider audience included asynchronous anonymous communication and use of the Internet (DFAQ is a web-based application). Input into the DFAQ takes the form of typing questions and / or typing responses to questions. A user needs to have access to a PC with Internet connectivity. However, student questions often arise when they are studying or when reflecting on what they have learned, and these activities are time and location independent. There is therefore need to investigate the potential of using mobile phones (which over 80% of students own) as an extended interface to the DFAQ. It could therefore be useful to investigate the research questions addressed in this thesis in the context of mobile technologies.

## 7.6 Implications of the Research

In this section, I will discuss two issues: a) implications to knowledge sharing problem, b) implications to IS practitioner.

### 7.6.1 *Implications to knowledge sharing problem*

This thesis arose from observing undergraduate students consulting one another, exchanging valuable information and preferring to consult fellow students rather than subject experts. I concluded that students were collaborators. This led to two questions. Firstly, I wondered about the nature of knowledge shared. Secondly, I wondered about the potential of such knowledge to diagnose learning. I thought that the creation of a shared knowledge resource by students for students would benefit students by extending a one-to-one consultation to one-to-many students, and that the knowledge of what they shared would lead to knowing how to develop specific interventions to help their learning.

The advent of information and communication technologies such as the Internet added a new dimension to informal knowledge sharing. Students used email, for example, to consult other students. Czerniewicz and I (2004:244) reported that 86 percent of student activities in computer laboratories at UCT involved communication with friends and family via email. My theory was that students consulted each other as a way of addressing the challenges of academic pressures.

My observation of the said phenomenon led to the identification of two problems: how would other students, absent from an informal consultation, benefit from the knowledge exchanged, how would an educator access the *minds* of students and diagnose student knowledge levels. The two problems, though separate, had a shared solution in that addressing the first problem would facilitate the resolution of the second.

Both problems were wicked. Firstly, informal consultations do not take place at specific times in specific places and therefore no researcher can feasibly observe informal knowledge sharing. Secondly, it is a futile exercise to attempt to interview students on what they informally consulted with one another in the absence of seeing them consulting. Thirdly, I did not want to setup a laboratory experiment for informal consultation as that

would distort conversations and invalidate the research findings. It is against this background that DFAQ was conceptualised. The DFAQ has contributed to addressing the problem of informal knowledge sharing.

In the next section, I discuss the implications of this research to IS practice.

### **7.6.2 Implications of this research to IS Practitioners**

The need to address the implications of IS research to practice is motivated by the fact that “one of the frequently levelled charges against IS research is that it is of little relevance to practitioners” (Fitzgerald, 2001). By way of example, in their recent work Jones and Karsten (2003) reviewed the work of Giddens and its application in the Information Systems field and report that “between 1986 and 2002, 225 Information Systems articles, published in leading journals and conferences used Giddens’ Structuration Theory”. Jones and Karsten’s findings are that Giddens’ Structuration Theory has been extensively used in IS research without been put into action. I argue that it is an IS practitioner who does the “putting into action”. It is ironic that IS as an applied field which should be concerned with the latter, now risks becoming irrelevant to its own mission.

It is my opinion that the future of IS largely lies in its preservation of credibility and this involves bridging the gulf between IS research and IS practice. Without sensitivity to IS practice, IS research is useless, to say the least. Fitzgerald (2001) reports:

*A very successful IS practitioner delivered an extremely insightful and thoroughly entertaining plenary address to the assembled congregation of IS academics. This was not one of those occasions where the academic audience publicly applauded politely and then later privately scornfully dismissed it as excessively simplistic and deterministic (an all too frequent scenario, unfortunately). At the end of the plenary session, the conference Chair thanked the practitioner, and as a gesture of appreciation offered him the weighty, multi-volume set of the Conference Proceedings. Even before the dismay registered on the face of the speaker (and it did), the audience erupted into spontaneous laughter. Yet, if the very idea that a successful practitioner could learn from the most leading-edge research in the IS field is a source of hilarity even to academics, then, as an applied discipline, IS clearly has a credibility problem.*

Fitzgerald has a point. The current divide between researcher and practitioner ought to be reduced to make IS research relevant to practice. Research trends in IS suggest that little is being done to address the relevance problem. There could be many reasons for this, but Fitzgerald argues that the main reason is that "...few researchers are former practitioners, or make any attempt to closely couple themselves with practice." I infer from Fitzgerald that there is a gulf between IS research and IS practice. It is a gulf of language of communication. My argument is that there is a need to find a common discursive platform.

This research contributes to demystifying the theories for IS practitioners. In particular, my framework will help practitioners to understand the interplay between computer mediated messages (text); discursive practice (interaction which produces text); and the social-cultural context of users (mindsets that users draw upon during interaction).

I have demonstrated how theories of text gives effect to the text component of CDA; theories of communication and theories of human interaction give effect to the interpretation component and how the theories of human actions explain the social action component of CDA. My conclusion is that an integrated three-dimensional framework consisting of text, interaction and social context contributes to *putting Giddens into action* in IS and gives a way of applying CDA in computer mediated interaction.

## 7.7 Review of researcher's experience

The process of finding appropriate theoretical lenses to underpin this research has not been without challenges. Having been 'born and bred' in natural sciences, with a computer science background, shifting my paradigm to an interpretive paradigm was a daunting undertaking. The purpose of this section is to share some of my experiences with those IS researchers who may have to make a similar conversion.

I needed to understand that a research paradigm is not a theory but assumptions made about a problem under study. Paradigms are not something to be afraid of. Every researcher makes assumptions about the problem she investigates. The assumption a researcher makes affects the choice of theories. For example, I had to assume that there was a relationship between questions and knowledge. I assumed that questions are

expressions of intentions; and that an expression is constrained by both language and a mediating tool. I will come back to how these assumptions influenced my choice of underpinning theories, but before I do that, I need to mention that Burrell and Morgan (1979) provided a useful map by reducing the research paradigms to four. According to Burrell and Morgan, there are four research paradigms: radical humanist; radical structuralist; functionalist; and interpretive. In other words, there are four ways of viewing the world as Burrell and Morgan (1979) stress:

*In identifying four paradigms in social theory we are in essence suggesting that it is meaningful to examine work in the subject area in terms of four sets of basic assumptions. Each set identifies a quite separate social-scientific reality. To be located in a particular paradigm is to view the world in a particular way. The four paradigms thus define four views of the social world based upon different meta-theoretical assumptions with regard to the nature of science and of society (p. 24).*

Traditionally, IS paradigms “largely emerge as serving the technical interest, with labour applied as purposive-rational action to achieve transformation by application of the means of production: information technology and functionalist planning methods” (Clarke and Lehaney, 2000:8). Although the investigation of the phenomenon of informal knowledge sharing involved the use of DFAQ, I was less interested in studying the technology, but rather the technology mediated social interaction for knowledge sharing. I therefore did not have a technical interest *per se*. It is ironic though, that IS research should ever have adopted a technical view as Jones (1999) contends that “IS are seen as social systems, existing in social and organizational contexts that influence their development and use, and are also implicated in sustaining and changing these contexts...” (p. 103).

It was clear that I shared Jones’ perceptions of IS, and therefore made an interpretive paradigm assumption which is “...informed by a concern to understand the world as it is, to understand the fundamental nature of the social world at the level of subjective experience. It seeks explanation within the frame of reference of the participant as opposed to the observer of action” (Burrell and Morgan, 1979:28).

Let me come back to the choice of underpinning theories. I was mindful of the following characteristics of the phenomenon: interaction of human beings, the exchange of messages, and thinking that affects interaction. This led me to CDA-GST knowledge sharing framework.

## 7.8 Final Conclusion

I will highlight some of what I consider milestones of this work. Firstly, I have questioned the conventional wisdom of Frequently Asked Questions (FAQ), proposed and coined the term *Dynamic* to prefix FAQ known as DFAQ (see Ng'ambi, 2002c; 2002d). Some of my criticisms of static FAQ lists include the fact that “they are less useful for gauging user information needs and for devising appropriate interventions for different categories of users” (Ng'ambi, 2002d).

Secondly, this research has shown that the DFAQ is a social, educative and communicative tool. Informal knowledge sharing among students is a social activity. Students constructed and de-constructed knowledge. Computer mediation facilitated the exchange of questions and responses. DFAQ artefacts were an outcome of interaction.

Thirdly, informal knowledge sharing involved three dimensions: information need, computer-mediated interaction, and social action. The CDA-GST framework has provided a way of gaining insight into the complex inter-play between information need, computer-mediated artefacts and social action. This research has also shown that the DFAQ widens audience access for student consultation, provides access to the “minds” of the consulting students, causes cognitive shifts, and that students do learn from one another (Ng'ambi, 2002a; Ng'ambi, 2003; Ng'ambi and Hardman, 2004).

## 7.9 Final Word

Finally, IS research ought to be grounded in practice, and practice in research. It appears to me that the success of the IS field will depend on the extent to which the gulf between IS research and IS practice is reduced. My hope is that this thesis has contributed to the reduction of the gulf.

This research has shown that the DFAQ, like other information systems, is a technically grounded solution implemented in a complex social context to solve a wicked problem. This has been my research journey *towards knowledge sharing based on student questions, the case of a DFAQ environment*.

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*Appendix A*

## INTERVIEW TRANSCRIPTION

The evidence is organized as follows; Part A (A1-A43) gives a detailed account of one of the student's experience. The story was captured on a Dictaphone before transcription; Part B (A44-A101) is a focus group discussion. The discussion involved three students and was structured such that each student spoke individually at length, then followed a discussion in which followed the pattern of a conversation. The discussion was captured on video; Part C (A102-A109) is a transcription of comments from an open questionnaire administered to the whole class. The comments were sought shortly after the end of the semester (last day of the course) and were therefore reflective.

## PART A

- A1 With the working full-time, with all of us that are working, we need a full-time job, to actually be able to pay your fees to do a degree. So all of us are finishing work at 5, and you don't get to the lecturers. So it seems almost ludicrous in a way to be paying those fees when you're not sitting in a class. And you need access to the lecturer; and a lot of the time, it's not necessarily that you have to see them in person; it's to discuss something with them. Whereas if the DFAQ, you could actually post questions to them. It solves all of those problems.
- A.2 I mean if you look, most people, what, if they finish early, it's four o'clock. By the time you've got through, realistically, things like traffic, by the time you've actually got there, if you've made a concerted effort – I mean, on the days that I did see X(name of lecturer), I've had to dash back and forth. And it was really, really difficult and I've normally had to cancel something else, you know, it's just a logistical nightmare, and I just felt that it wasn't worth it.
- A3 I mean things like weekends are the, basically the only time that you do have to study, because you're working during the week, so, for me, what I was doing was I'd go to my lecture on a Monday, I'd try and work in the evening, which was very difficult because I was preparing exam papers or things for my own

students, and then work over the weekends. And then you don't have access to your supervisor anyway; cause that is the only time that you've actually got.

A4 If I just look at what was absolutely amazing about this course, which I've, for me specifically, I've found at school, was if I didn't understand something, you just shut off; it's easier. Because you can just hide behind a class of twenty, you know what I mean, if you don't understand, you just keep very quiet, you know; nobody knows. Whereas, with this (DFAQ), you could actually, for me, one of my biggest learning curves was, um, looking at other people's questions. A lot of mine were answered by looking at how other people think. Cause you immediately get things mirrored.

A5 Or a light just goes on and you think to yourself, "Oh that's..." you know? And then, the more you read other students' questions, the more you're changing, because you're constantly having to reflect, it's that thing that I said with the Rubik Cube, where you constantly have to look at it in different ways.

A6 The site played a very big part in being able to get marks in the 70's, at the end of it, even though I didn't have the most enormous amount of time. Because I could actually [cognitively] shift on, and I could actually feel it happening, because I could engage and could take my own time to go through, and I could scroll back.

A7 You can go back and review things once you've had a lecture and actually see, what is it that I understand now, and how was I thinking. So that in itself, the ability to actually go back and login to the site at different stages of your own development, to me was amazing. Cause that way you really, it's very concrete. You can actually see how you're growing the whole time.

A8 And I just feel, as post-grad students, they really need to... if we are paying close to Xees a year, which is a lot of money, and we... if you look at the amount of time that we actually spend in class with the lecturer, it's not relative, it's not relative to what we're paying. We should... and it's not fair because we working full-time, that we haven't got access to it. I mean, and the lecturers... and often

it's not necessary to make a whole appointment. I mean if you could just actually login to a site for like this.

- A9 You know it would be saving the University and us a lot of money; you know, it just seems so much more efficient, and it seems like such a logical way of doing it. That's why I'm saying it's so ironic that there's this Global Village, that the world's getting smaller, but we don't seem to be doing it, you know? We don't seem to be applying it, you know, as well as we could. And I'm just looking, for me, which was a feature I feel very strongly about, is there is a desperate need for it, um, in classrooms.
- A10 I felt like I connected with, in a matter of, I mean, what was it, a semester, more than, you know, kind of, in a class for a year. And I think a big reason was barriers were broken down, because all of a sudden you realise, where, I mean, I, sort-of, I can remember when I read the first text, kind-of looking around and thinking, "I'm not supposed to be here. I feel really stupid found about now!" And just thinking, when I posted something then I just thought, well, I'm just going to, nobody knows that it's from me, I'm just gonna post all these questions. And I posted basic, basic things, you know, if I look back now, I can see that, they, I clearly didn't understand basic concepts. And um, you know, before one had actually started reading. And then, going back and looking at some of the other students' questions, just having this absolute relief of... we're all in the same boat.
- A11 I realized that the whole class didn't understand. And then there was, you could just see this anxiety lifting, and it was the same with us. Once you looked at everybody else's questions, you felt freed up to actually ask, and to say to one-another, you know, what about this, and ask one-another questions, you know, and not have the fear of, I've got completely the wrong tail-end and I look completely ignorant; cause it's like that when you go into a class with new people.
- A12 And it's been an amazing course to me and my key would be... keyword would be, um, for the first time is accelerated learning. I really felt that, um, I could learn when I needed to. Not just between certain hours and at a certain pace,

according to a class average, like I said. And to me, that's why I feel so strongly about it. I think, partly because, um, people, I find, in a classroom, you have such a diverse group of people.

- A13 I'm not a person that memorizes and can do parrot-learning, and I just was not stimulated in my way of learning. And, not ever having that, and almost being, sort-of, angry about it now, because... if one could do that then a child would accelerate and you can improve, at your level, and expand; as opposed to just being in this void of just going through the system and being okay.
- A14 And for the first time, um, I felt that learning was happening. I could ask questions when I needed to, go at my pace, um, and be exposed to... I think the reason for it is, it is an active environment. It's not the same as, um, like you said, just a chatroom or something, it's actually active; there's movement. Every time you login there's something different; there's more questions; there's stuff that's being answered. So you constantly have to take cognizance. You can't login to it and that's it, stops there. Each time you login there's something different, so you constantly having to rethink and re-look and build and accelerate. And that, to me, was the biggest thing that I felt really strongly about. For the first time it actually felt like I was doing a course that I didn't mind paying for, 'cause I really got my money's worth out of it.
- A15 I felt that I was being fed the whole time; as opposed to, you know, "there's your meal, that's it." You know? That's where it stops. That you're actually being... it was tailored to you and to your needs; you could login and ask for whatever. And that, to me, is knowledge, and that is building and I feel like I've actually walked away with something that's rounded, and that stimulated me enough to go and research it more, go and read up about it; you know, it's got you going, as opposed to just... it's three-dimensional as opposed to just one-dimensional – the notes, the lecturers and that's it.
- A16 Before you'd go into a flat panic, 'cause, when you, as you study, obviously things come up, you know, that you can't, um, that you then want to ask your lecturer, and it's over a weekend or whatever. And just thinking to myself, if we actually

had access to the site, you wouldn't have to do that. You could go onto the site and, say for example, you were doing a paper like we did on Equilibration. And, I mean, now you've got to brainstorm; you don't know how you're gonna start your paper. If you logged into the DFAQ site, and actually looked at people's questions, it would set things off, and it would give you a kick start.

- A17 What's really nice is even though you're learning, and you don't know a lot, and, like, you know, you start off really as a baby in a course, 'cause you don't know... But, if you know that your opinion matters, you're going to be impassioned to carry on learning.
- A18 One time we logged in I had one of the students sitting next to me, and he said to me, "Go and rate my question. I want a rating now." And I mean we were joking, wanting to "rate" one-another's questions! But it, in a way it was very true; because you wanted to know what your peers were thinking, because that is somebody that is on the same level as you. You are very much shaped by your peers, and what people are thinking and how they view it. And I know for me personally, that was a big thing.
- A19 Like learning a language – the more you're exposed to it, the more you have things reinforced the freer you begin to feel with it, and the more comfortable. So if you're using, if you're answering and being rated within a site a lot, you're more likely to do it outside the classroom and start engaging in conversations with people that you wouldn't normally, about classroom experience.
- A20 As a student it's quite nice to know that your opinion is valued. To realize that the little bit that you do know amongst yourselves does matter. It's quite, and it's good, 'cause I think it's a marker, like you know, that you are going somewhere; you know you're on the right path.

- A21 If one can use the example it's as opposed to learning a third language and speaking a third language. It's going to make a lot more sense if you're in a situation where you have to speak a foreign language. And it's the same with questions; you're actually forced to introspect. I mean the only analogy I could think of which for me stuck with me the whole way is the Rubic cube, which, I don't know if you remember, you used to get as kids, with the different colours? And you had to match. Now, that is what happens to me; that's what I felt like I was doing with the text. As opposed to saying, this is a Rubic cube and you're not allowed to touch and you're meant to match the colours – a one-dimensional level; whereas with the DFAQ you're actually, actively manipulating and finding ways, you're busy forming patterns the whole time.
- A22 The amazing thing with the site was that there's so many different questions cause of the different ways people learn, that you're actually looking at, for me, what was learnt, in so many different ways, that at the end of the day, you're looking at it up here [*holding five fingers horizontally above the fore head*], as a really educated person, and have a very good understanding. As opposed to having a whole lot of things that you've learnt and you can't really place them. So with the questions, especially with my peers, I have an understanding of it from fifteen different ways, I understand it; as opposed to just my way where there would've been gaps.
- A23 It's very easy to go to lectures and to memorize stuff and write down, in the exam, and get an A. But can you apply it? And you can't apply it unless you've actively engaged in it; unless you've manipulated that knowledge; unless you've had to explain it. Every time you do that you have to rethink it, and that was the amazing thing for me with the questions; cause every time a question was posted by my peer, it was on my level so I had to go and re-think. When it was a question where it seemed like somebody didn't understand something basic, you the have to go and think to yourself "Why? What is that they're not getting?" It's not just the answer, it's about their thought process and how they're thinking.



- A24 In a classroom setting you've always got, you see, in a group of 25 the whole social part of it comes into play as well, where you've got kids with strong personalities that will overpower the shy kids who aren't necessarily dull, they're just shy. And, um, sitting in front of a computer where you're all levelled, it's just about the content. It's just about the subject content; there are no issues about role playing, about "I'm cool, you're not".
- A25 But this is almost like having a window on the student's brain and their development, as such. So if they login on different levels, you actually have got a window on their development; you can actually see where they're going. And it would allow you to, um, that's why I say, I can't believe we don't use it, because it would allow you to structure your lectures in such a way that you're specifically guiding it. So that you are navigating them in that you know where you're going, and you kind-of just set course and hope, you know, that they get there but this way you could actually manipulate it according to where they were going with it and according to the group; maybe you have a group that's very strong in a certain area or learns in a very specific way. So you could actually manipulate it. But they work hand-in-hand – that's the word I was looking for.
- A26 You could actually use it as a lecturer – it's a complete window on a child's development. Cause you've got the, you've got that environment where the growth takes place. And as a student I always used to get quite panicked, cause you go to a lecture, and you come out of there, and it's all this new stuff and you have to go and read up to kind-of get onto the next level. And just as you've got there you next go to the next lecture and, there's a whole lot of new stuff, so you feel like you're constantly quite out of breath cause you're just not getting there. Whereas this way (DFAQ), you have your lecture, you're bombarded with new knowledge, and you then go, have time to actually go and manipulate work through it and digest it, in that environment.
- A27 It's a safe environment where you've got the anchors, to go and ask questions and look at things, review things and think things through. I've found you just go

to your next lecture just a little bit more mature, sort-of on the next scaffold, slightly. You just step from one phase of your development to another but more comfortably and with more confidence; as opposed to kind-of grappling.

- A28 I just felt like it gave me the space to grow. I wasn't being forced into things the whole time. So I think for both student and lecturer it's a very important environment.
- A29 There were people that I would probably never have spoken to. D' you know what I mean? That to me what was amazing; 'cause there's not this whole social setup in the classroom and, you know, everybody's taking time to get to know one-another, you actually get down to the nitty-gritty.
- A30 To me as a student, what was amazing was being able to go back – those questions didn't disappear. I could actually go back and look at things. So you actually, you've got a marker, you can actually go back, and it's kind-of fitting. It's like having grappling hooks when you climb – you can actually see where you've come, and you've got something to measure by, and it's active.
- A31 The site was a window on everybody's development and everybody's growth and everybody's space of learning and level of learning, where you could actually see it objectively, and looking at it from the top and actually seeing where you're at.
- A32 It's almost like quoting out of context, where a student goes off on a tangent, and you can see they've clearly taken something that they've read somewhere but they've completely misquoted it and misunderstood it. It's not that the quote they've taken is wrong, but that they've understood it incorrectly, and I think that's the danger. Just with the nature that we are, might decide that you really identify with something and then go off and completely misinterpret it.
- A33 You feel safe to ask what you're really thinking, like, you know, what Equilibration is, even though I know we did it last week in class. Whereas before if you didn't have that you might fall behind because you know that your lecturer

discussed Equilibration, you were actually meant to read this week and you didn't, So what you're going to do is be really quiet because that's going to be a complete dead giveaway, then rather fall behind, for fear of looking stupid, you know?

A34 There were so many sort-of silly questions being asked that you actually felt like, now, you actually got quite fearless about it, where you'd ask whatever you wanted. You asked whatever you wanted because you haven't got a time limit, where the lecture's going to end now and you're not going to waste time, and you haven't got twenty sets of eyes looking at you, scrutinizing you when you ask, and you haven't got people being impatient with you now wasting their time, and you haven't got all those sort-of social baggage that goes with it.

A35 And it was really comforting to see that you could all ask what needed asking, you know. Especially on a post-grad level where you feel like you should know stuff, you know. I just felt that this way, I got onto a level higher, if somebody had said to me, if someone had shown me the texts, I would've never registered for the course. I would've gone, "Oh, my word, I'm never gonna understand that!" And to think of how much I've been exposed to now, it's such a short time! I can't believe it was only a semester. Because you're constantly being changed each time, it's like a pencil making an impression on paper – if you do it enough; it's going to make a hole eventually. So each time that you've got a question thrown at you, it makes impressions, and until eventually there is a breakthrough.

A36 I can't believe that we don't have it (DFAQ) for other subjects. Because you're very limited – your voice is very limited. I'm a student who would get, like, in content subjects like this, it's all 50's, 60's, maybe. I've never been like the all-found A-student, but with not a lot of academic background, could register for a course that I had no background on, and it's an Honours course — and get 73% there's got to be a reason. Something about that course, to pull a student onto that level of understanding – I mean it's not an amazing mark, but with no background, there's got to be a something. And I think they need to actually start looking at things like that and saying, what are people like you [pointing at

the researcher] and [lecturer] doing that's pulling students out of that zone. For example, why am I underachieving in the other things [subjects]? It's because I'm being stimulated, I can tell you that now.

- A37 I found that it's helped me so much in my teaching and learning new things myself. I can say to myself, look at it from five angles and say, okay, what is it, M, that you're not understanding? I've walked away, from this course in six months, more than in my degree.
- A38 I haven't done any education courses, I haven't done any psychological courses, I came in there not knowing a thing. I'd never heard of Vygotsky, I'd never heard of Piaget. So, to be able to manipulate a text and to be able to have, even if it's only 73% of what's being offered that I know, in that short space of time on my level, that's quite amazing.
- A39 And I really feel like, for the first time, I'm paying fees for something that I'm really getting. You know? I've really learnt; and I just wish that they structured more courses like that because the difference between this and any other course is that you actually go out there and you do something with it. It's not a book you go and pack away on your shelf.
- A40 I actually know that everybody at some stage doesn't know the answer in their lives. I'm going to find it very difficult to attend any course after this, if we don't have this (DFAQ), because it just seems unfair. It just seems like you start on a back foot.
- A41 I really wish that they could structure a whole education course like this. Cause that, to me, is really learning. And also cause it forces you to go out there, and actually I did more reading than I've ever done for anything – and not because I was lazy but because I was stimulated now. You're not being asked questions, you're being stimulated to go and look. You're driven to go and find the answers.

- A42 I take the brightest students in my class and I just... you know, looking back on it now I look at all the kids that think, "Ah, gosh, she's so bright!" She's brighter than they are but she's inquisitive as all hell. She asks questions the whole time. So she knows a lot more, not because she's got any higher I.Q. than them, but she comes from that environment where she's constantly stimulated, you know. She'll want to know.
- A43 You can ask the immediate need, which is the definitions of words, like, take for example, Equilibration again – you can explain to them immediately, which is going to satisfy them here and now, and put that at rest; and by looking at the other questions, I mean they themselves are then going to have to look further than that to actually make sense of it.

#### PART B

- A44 I am a teacher, deputy principal at the school where I am. I do part-time studies which is a bit tough so I come here at 4 o'clock, the school ends at 3.30 and I rush through to UCT and get home at about 6.30, 7 o'clock sometimes. And doing the learning and condition course this is where we were exposed to the DFAQ environment.
- A45 I am the only one travelling from the Southern Suburbs that I know in this course here. Of course the others are from different areas so it is difficult because we work full time and study part time, it is difficult to sit together as a group even after class because we still have community work. Speaking to my colleagues at school wanting to know what is happening I told them about the environment and how we can interact with one another now that this environment is being used.
- A46 I actually find it quite interesting in the sense that we compose questions and later on – a week or two weeks later can see how the questions were answered and some of the questions were really, you can actually smile because you can see where the student who most probably tried to answer the question was trying to engage in giving the right answer but the answers were not always spot on the way you were satisfied but you could look at another response and another

response and in that sense it was actually very interesting to see what other students had written about a question that another person asked or posed to them.

A47 Some of them really opened the understanding of which way a person wanted your question to be answered and only after you read again and read again and this is what the environment does, it gives you the chance to reflect and internalize what you have read and then realizing this is what somebody wants to answer you could go back and say, "No man this is not completely right", and then you could actually add your response to what his responses were.

A48 I asked a question "how does equilibration happen" and another question on an "example of accommodation and assimilation" and all these little questions led up to the big question of equilibration. So where some students wanted to know about assimilation and other accommodation, and if you added the two units you actually get to equilibration and that was very clear, that was very good because you could break up the questions actually where it was.

A49 I don't find time to phone my lecturer. I make an appointment immediately after class and there are so many other students waiting to see the lecturer whereas perhaps if the lecturer would also engage in the same environment we would have questions to pose at any time. This is the plus points that I think this programme could have you know where the students want to ask, because sometimes you leave here and alright you get frustrated with assignments and tasks that you must still go and do and that you must still go and read and sometimes the readings are very abstract and so forth.

A50 In the DFAQ you can pose the questions and leave it there and come back next week or a month later and say these are the answers but only again when many students have freer access to it. I am not too sure but I know all the Xcourse students know what the environment address is but other students for example in other courses don't know about it, I am not too sure but they most probably do not know because they did not engage in it.

- A51 After posing the questions, I had to go read and know what questions I posed and I read what students were writing about this question and the answers to this question and then only did I discover that this is actually what it should be and after knowing that now I know what assimilation is, I know what accommodation is and I know what equilibration is, which was the main and then I could search the classroom and see how it is used all the time which meant that somehow I came to equilibration and what it is supposed to do.
- A52 I know now what it means you don't go back to that, you will most probably pose a new question – it could be anything else in the same area that you were studying, but now and the end of the year I finish my course, the question is still, will I be able to access the same thing with other questions because I am not a student here anymore?
- A53 The question will remain and first answer may not be the right answer but the second student would come and say, "No, but if you view it from another perspective, this is the right answer", so all the possible right answers will be given until somebody will say, "This is the right answer according to this or someone will argue that it should be like this, so we will always have the different answers to one particular question.
- A54 I did not agree with many of the responses until I went to read up again and realized that this is what it should be but I did not post my response again to those questions. If you had answered a questions and you are satisfied yourself by reading up then go back to the environment and put the answer because somebody has checked your assignment or something and said that this is acceptable in the environment and somebody else learns from it. It is going to make assignments and whatever much more easily for other students than for us that started with the environment.
- A55 I think that there is lot of potential for the programme. The only thing is that it must be accessible to all students; it could be an architectural student that could know something about knowledge or a psychology student or something like that.

- A56 I just feel that there are others that could also read up like it was most probably only the psychology student that answered the questions but what about the technology students that would perhaps have a different idea about what equilibration means for them and look we would want to say that there are many others that would be more knowledgeable than what we are because they engage with it full time at UCT whereas we are only part time students.
- A57 I was quite interested in what people were saying about the programme and I would most probably want to hear what other students say about the programme. There is definitely lots of potential. I don't think that there are any negative things about this programme besides that the site name is very long and we might not have access and we might not have this kind of media where we are working but we know that we have been part of all this.
- A58 I think it is really necessary, I think we needed something like this for a very long time, especially with us post grad students, I think so many of us have to work to finance out studies, it is not a situation where your studies get paid for anymore so a lot of post grad students are forced to work full time so your access to your lecturer and your fellow students, you know it is not that possible to see them.
- A59 What really brought it home for me because you actually get to actively manipulate the text as opposed to just having a class and going away having your own opinion where you may be developing a misconception because you are just not that informed. When you engage with other students you really get a global idea and get to look at it in different ways. It is a bit like the Rubic cube scenario where you actually manipulate to get the patterns like it should be. You know it a three dimensional not a one dimensional, things you miss from students just the way students ask and then you realize what you don't understand and what it is that you are missing. So to actually engage in a situation like that to me was amazing.
- A60 I feel that to have the lecture explained and to come and sit down and see, I mean often as student when you are in that situation you think you understand



and you go home and write some things and then you realize that there are some questions that you would like to ask once I have read a bit more and in that sense it is almost like a vitamin, it really keeps it balance.

- A61 Getting a better idea learning from one another as opposed to, I mean because you definitely have a different dimension of learning among your peers or people in your own situation as opposed to just a lecturer, so to have both is absolutely amazing and work wise to be able to log onto, if one could log onto this outside of the university, there is just a huge need for that.
- A62 A lot of the questions were answered but not all of them, that was the only problem I had but I could go and look at other students' similar questions that had been answered or even have my questions answered by questions, have the realization of what it is that I was missing. So what I did when we logged into the site again was to actually go to those questions that had not been answered and just to look at other students answers to those questions.
- A63 As the class progressed, in retrospect looking at them I can see where there were areas that I did not understand that were explained to me and they fall away and you ask other questions.
- A64 It kind of makes it more of a journey of coming to the answers which make it just more concrete and if you find it for yourself you learn a lot more so those questions that I think, not all of them were answered but the ones that I did have answered when I went back to every time, a lot of them I came to know because of other students questions.
- A65 The only thing I struggled a bit with was I almost in a way wanted more headings of sections so if your want to go and look only under equilibration, those subject related headings because there were quite a lot of questions and there were quite a lot of us, so I found that I would go in and look for one thing and then get carried away with something completely different, and look at other areas which is great, but if you are restricted for time you want to look at something specifically, that is just for me who don't use computers that much.

- A66 I just think it takes a huge anxiety away because if one could have access to DFAQ there would be no reason to misunderstand or to not have things substantiated, so if that was in schools and I just look at the schools for myself, if that was available in classrooms, I was thinking of accelerating the situation, if this environment was available so that you could lay out projects for them, you would not have the problem of kids in the class who have different needs, so I think in the classroom setup definitely, at schools and at varsity level, more and more students have to work full time and you don't have access to one another either so much anymore as you do other graduates who are on campus all the time.
- A67 For me personally I like to have a wider knowledge and I want to see the wrong answers as well because I see it a certain way, so I like the active engagement so that you have actually accumulated knowledge is great so you actually have to start thinking and it actually makes you search and I think that for me was a nice experience where you actually felt that you were manipulating as opposed to just taking it in and leaving it there, you actually had to shift around and I mean for me it was a whole because you could see yourself being forced to reshift things because you were being exposed to different knowledge.
- A68 Also you were not put under pressure for immediate response, you could actually think it through and kind of give the response you wanted as opposed to thinking afterwards, "O I could have said that", you actually have time and you could go back, that is the very nice thing, and you can when you think of something you can actually go back and I find that even what was quite nice was that students, I found that we as students did not have that much interaction but once were engaged on site there was a lot of interaction going on – you start and it takes the fear that you are the only one out there that does not understand and you start realizing that actually there is a lot of similar questions and I just found afterwards for me that I spent more time with students than before.

- A69 First of all, I am not one to talk much in public and I find it difficult still at the moment still and what I find nice about this environment is that I can now ask questions and get my answers without having people looking at me and I can even attempt to answer some of the questions without that uncomfortable feeling that you get when you are face to face with people.
- A70 We don't know who the questions are asked by and who answers and it helps, sometimes not because I was looking at the answers at home and I was not sure if it was X answers, the lecturer or whether it was another student and I would like her to put her initials there when she answers the questions so that I can know that this is definitely the right answer to the questions. Not that I doubt the students that they don't know the answers but if it comes from X we feel more comfortable with it.
- A71 Sometimes I find two responses to the same questions and sometimes two different responses and depending how much I know about the topic I would then see – well this one did not come from X but not always.
- A72 If I just go back to equilibration, there were many responses to this because the questions were put differently but you come out to the same question at the end of the day and when I had to do my task for equilibration, I went on line and I found these questions, so it just sort of helped me when I did the assignment, the way other people put it. English is not my first language so it is nice to see how other people put it, the words they use, their vocabulary.
- A73 In the DFAQ environment we don't know who puts the question and who gave the answer so it would be so much easier to respond here, and not to criticize really but to disagree than when somebody says to you face to face.
- A74 And then it is also more honest because everybody comes with their own background on it and I think it is more of an honest view and for me it starts becoming more about the subject content than more about not offending anyone, for me you all have the same goal as opposed to thinking I don't really know that person, it is just more honest and it becomes more task specific or

subject specific, you cut to the chase, there is no airs and graces and nobody gets offended.

- A75 In a face to face, somebody could say to you the answer is so and then give a long explanation as to why the answer is so and that could be that person's own perception, whereas here one powerful sentence or one powerful answer makes you realize this is the focus or it is not. There is no excuse for what you want to know. Many times with the children, they expect us to be so knowledgeable about everything whereas most probably if we had to write it out it would have been of more substance to them.
- A76 I quite like it, I think it is time efficient as well, because although you don't necessarily know your fellow students that well, there is no time for airs and graces, you really get down to actually working with your subject content.
- A77 And the fact that they don't see you when you have to post a question or when you have to answer some of the questions so you feel more confident to do it and nobody is going to look at you.
- A78 Yes, everybody has an area of a subject that you feel incompetent in and you don't sort of want to feel like a big idiot, so that way you can ask freely and actually with viewing the other questions. And there is also that something about actually reading it as opposed to hearing it, you can go back and look at it again.
- A79 And the answers can be rated. That for me was very good because you could give a low rating to an answer and then again a high rating and say "This is excellent"
- A80 You have to think about it as well, you don't have to read it and leave it there, if you are going to rate it while you disagree, how strongly do you disagree, what is it that you don't agree with.
- A81 And the rating that you would give would not, because you read and read it and you understand and you have viewed it from every angle that you want to rate it

and then you give it a rating, or low or high but you would post your reason and I felt very exciting with somebody rating your responses.

A82 And you also have to substantiate, you actually really have to go back and know what it is you really feel strongly about. You don't have to agree, you have to actually think it through and of course physically go and type it out and process it.

A83 And with that you internalize all the time, you read it and it fits in with what I want to know or it does not.

A84 And then when you go and read it, it makes you know what you are talking about.

A85 And even with amongst the students I felt that students felt freer. It was like it broke the ice. You engage and then you realize everybody has got certain areas they don't understand or they have similar answers to the people in the class and it almost kind of just broke that initial anxiety.

A86 I think the highlight for me was when you typed your question and later you checked if there was a response there and what was the response or you got many responses or you did not get responses.

A87 Yes and the fact that you can put in a word or whatever you looking for an answer for something and you can type it in and you will find all the questions or the responses.

A88 It is nice to get immediate feedback cause before you only get feedback once you get a certain percentage on an exam and then you realize – “Oh OK I have gone a bit astray there”, whereas this (DFAQ) there is an instant response.

A89 It is so necessary and after using it I can't imagine not using it because it was so helpful and it brings your subject matter alive, I think it should be in schools and

universities, for myself it has been absolutely amazing that you can go and look at subject matter and turn it around.

- A90 My highlight of the whole thing was to be able to if I did not understand something about a certain concept having gone in and having one view of it and by the time I have read about 15 questions have a completely different view. So for the first time it is a course where you actively engage and you actually have to understand, you are forced to and you develop, you can actually see your views developing.
- A91 As we were just saying when you pose questions to one another, you can actually engage with the little ones (*meaning easy questions*), with those who are not so ahead (*novices on the subject matter*) and have one on one sessions with them on your own.
- A92 I just need to come back to the other issue where you don't have the confidence to speak up in front of other people and you always find them in your classes and wherever you go so it will be good for them as well.
- A93 Even amongst teachers if you could have a system like this where you can just source from one another, you are going to give such a more rounded education, and I think it is even more important now because we are working in more diverse classrooms now with kids with such different backgrounds and in order to benefit they need to be in an environment where they can be free to learn from one another and actually engage and with the computer system.
- A94 A child with a higher literacy rate, can actually engage and learn from one another and even in classrooms, for me what I was thinking would be amazing was if you sitting with a class where it is not maybe first language learners or of differing progress and background where you can maybe create a task for some students and have an opportunity to split into smaller groups to work with students who are struggling on a concept and we give them a chance, that way they are constantly benefiting from a class and not having to wait because there is just one teacher.

- A95 I don't have such a vast background on how to do a lot of reading, I often found when I was reading there were certain things where before I carried on I wanted something explained to me now or I wanted to have an example of it or be able to have it elaborated as opposed to doing a whole reading and then going back and trying to understand, it was so much more time and I think to have it taken away (*referring to the DFAQ environment*) now that you have come into contact with it would be terrible. You become addicted quite quickly.
- A96 And sometimes we read at home and things are so abstract and there is nobody that you can ask and sometimes the dictionaries do not explain everything that I want to know so it is very frustrating whereas in this environment it would be excellent. And even for a student who comes to university in first year.
- A97 You would not feel like insurmountable; it would actually do a lot for your stress levels as well. I think they should research that as well. It is just very positive.
- A98 I did not find anything negative about the program; I just thought it was very good. You engage with it knowing that there are others who most probably have the same feeling.
- A99 It would be very interesting because there must be a huge difference between students who are exposed to it (*DFAQ environment*) and students who were not, you could definitely see that students who have actually come and engaged in this task, are much more confident because you have a much better idea of what is going on (*referring to engagement with fellow students*), so it would be very interesting to see and I think the results would speak for themselves.
- A100 Normally you would just get your readings and just look at it but when we had to do this then you really look at something and you need to do something, like the first session that we had, I did not look at equilibration and the way knowledge was defined but online I could sit down and look at it and go home and feel I had learnt something.

A101 And I think also especially for post graduate students whose research ideas change. You can start off with something and your ideas change and it is such a long process and this way it is almost like it has accelerated learning because you actually see everybody's views.

## PART C

A102 A102.1 Because I have got answers to some questions that I was asking myself such as: Is IQ the sample of intelligence, and others. Nevertheless, I can give a suggestion for the improvement of the DFAQ environment. I would like to see the DFAQ giving answers with more precision.

A102.2 According to my point of view, you have achieved your goal, in the sense that I have got answers to some questions that I was asking due to this environment.

A102.3 The environment helped me to find answers to some questions, I was asking myself related to the course, I am studying.

A102.4 The major disadvantage has been the lack of time in order to explore the DFAQ accordingly.

A103. A103.1 I had to engage in the text and could ask things that I was unsure of. It was interesting to see the answers that students came up with.

A103.2 In the DFAQ environment, you analyze the questions and answers. You have more time to think. You could ask as many questions as you wanted. You could read and digest the answers that were given.

A103.3 It was a new environment. All the questions were not answered. Some of the responses you had to rethink and did not always agree with.

A104 A104.1 It helped to get used to using internet to find information. As students we do not ask similar questions and sometimes we are afraid to ask people we are not used to.

A104.2 Working with online DFAQ environment I feel free rather than dealing with face to face interaction. It contributed to my learning experience in that I now know how to use computer to look for information.



- A105 A105.1 I found it useful because it enabled us to contact with our lecturer through the use of it (DFAQ environment. Again it has been useful because it gave us an opportunity to ask questions and get answers.
- A105.2 It gave us that chance of getting explanations of our questions asked by us, and getting the responses from our lecturer.
- A106 A106.1 I always write better essays after online discussion. You get information on things that you wouldn't have thought about. Things get explained incredibly well. I usually printed the discussion, and used some parts for my assignment of course, there is the lighter side of it, when people ask many questions.
- A106.2 More questions and answers unify things much better. You get to know things that you wouldn't have known on your own. It broadens your horizons. The questions people asked helped me a lot to understand some parts of Piagets Theory.
- A106.3 Crucial questions were answered, and profound concepts elucidated. I asked questions and I answered a few questions. It was an excellent way of learning. It was an eye-opener for me.
- A106.4 Not everyone ask questions in a conventional seminar, and the discussion is limited. The online discussion is a wonderful experience. You have a deluge of information from many people.
- A106.5 There is a lot to learn from the variety of questions and answers provided. Theories and concepts are explained in ways that make them clear. The various questions and answers raise your understanding of the whole course. It is an incredible way of learning and I always enjoy it.
- A107 A107.1 By remaining anonymous, I was free to deal with subject matter and debates in uninhibited manner.
- A107.2 Online manipulation of text helps you to actively apply subject content under supervision. Viewing other students opinions makes you view the subject objectively.
- A107.3 The DFAQ environment helped me to actively process and manipulate material presented in lectures. By viewing other students responses and questions I was really forced to think subject matter through as opposed to just accepting it.

A108 A108.1 I could see what others knew. They did not know who was saying what. It was comfortable because it was anonymous. One could ask anything.

A108.2 I was not sure if I was giving the correct response. In a face-to-face seminar, I get nervous that I even prefer email. The DFAQ contributed to my learning experience in that one can learn while in front of a PC. Ideas are shared among peers.

A109 A109.1 The fact that I could ask online question and also view other peoples questions and answers. I was able to view my own questions and that of other students.

A109.2 For me, it is a new learning experience.

A110 A110.1 Very guided, felt at ease with the environment. Easily able to ask questions, find the answer others questions.

A110.2 I learnt a lot more from this as I am shy and don't often ask face to face questions. It made me realize others had same worries as me. But, I was never sure if an answer posted on site is entirely correct.

A111 When I looked for answers to my questions, I could check online if somebody attempted to answer them. It contributed to my learning experience in that I could now answer/ask questions without the fear of looking/sounding stupid and being stared at by other students.

A112 A112.1 I was not always sure how to frame my questions. I tried to share in the questions not always in responses. One does not think that one has an adequate answer. You feel overwhelmed by perhaps your lack of knowledge.

A112.2 I feel that it is crucial for a student to do an exercise of this nature. I found it exciting that I could post my very own questions. I still needed to interact much more with my lecturer's notes in order to understand my work better. This is definitely not an easy subject. I struggle because I am an older student and I must realize that I received my accolades a long time ago. But, I do not mind to WORK HARD!!

## Appendix B

## QUESTIONS POSTED

1. Who is the knower?
2. Where is knowledge stored?
3. What is construction?
4. How do interactions between the knower and the objects materialize themselves?
5. What is assimilation?
6. What are examples of assimilation and accommodation?
7. What is accommodation?
8. How does the knower assimilate objects to the structures of his actions?
9. What is Knowledge?
10. If knowledge is not strictly determined by the knower and objects, how else can it be determined?
11. Who is the knower?
12. What factors influence the organism and the environment, and in that way influences Knowledge?
13. Who determines knowledge?
14. What kind of objects determine knowledge?
15. Explain the concept of assimilation?
16. What do structures of actions (or of operations) look like?
17. What is meant by knowledge?
18. Who is the knower?
19. How can knowledge be carried over to the knower?
20. What do you understand by the term knowledge?
21. Who do you think is the knower in a learning situation, the teacher or the pupil? Why do you say so?
22. Please explain the difference between exchanges or interactions?
23. Give a simpler term or phrase for fundamental relation?
24. Can one learn from someone by being in the regular company of that person?
25. Do you have some biology background? Assimilation occurs frequently, but how does it fit into the knowledge issue?
26. When is it an exchanges?
27. What is assimilates?
28. What are the structures of actions?
29. What is Knowledge?
30. What are these objects so constantly being referred to so constantly? How do you feel about this term?
31. Is this a complex relationship?
32. What is a knower?
33. Define reality?
34. How frequent should an interaction take place?
35. Interactions between the knower and the objects (between organism and the environment).
36. What is the object?
37. Interactions between the knower and the objects (between organism and the environment).
38. Knowledge is not determined strictly by the knower, or by the objects known, but by the exchanges or interactions between the knower and the objects (between organism and the environment). The fundamental relation is not one of simple association but of
39. Which objects?

40. What is the other name for fundamental?
41. What does fundamental also mean?
42. Write the other name for fundamental?
43. Give one example of this association?
44. Give a simpler word for the phrase "structures of his actions"
45. What does a structure of his actions mean?
46. Does this refer to sanity or insanity?
47. Does the knower differentiate?
48. What would simple association look like compared to assimilation?
49. Are these living or non-living objects that you are referring to?
50. Define assimilation?
51. What is meant by knowledge? What embodies knowledge?
52. Could the knower refer to either an individual or a group, depending on the context in which it is used?
53. Does the objects known refer to only concrete/factual things or also to beliefs/ideas?
54. How are actions structured?
55. Are unforeseen aspects new experiences?
56. What is reality defined by, in this context?
57. Is there a link between knowledge and association?
58. What environment?
59. What can we do to keep our environment?
60. Who is Piaget?
61. What is another common word for regulation? Do you think it applies here?
62. Do you think equilibration is balance-related?
63. Can knowledge be expanded?
64. Is there a stage where the knower and the object interacts?
65. Who is the knower?
66. How is the object related to the environment?
67. What happens to knowledge when the environment changes?
68. What does knower assimilate?
69. In which year did Piaget wrote this article 1992?
70. Who conducted the study?
71. Cognitive equilibration never achieves a stopping point; even on a temporary basis has a general universal principle. What do you think it is?
72. What is equilibration?
73. Briefly explain the three forms
74. Why are the states of equilibrium always exceeded?
75. Compare the subject and the object
76. What is the study of regulation? What is regulation?
77. Schemes or sub schemes of what?
78. What are superior totalities?
79. What does the word cognitive mean?
80. How are states of equilibrium exceeded? What is an example for that?
81. Does knowledge always immediately raise new problems as it solves preceding ones?
82. Which experimental science discovered and proved the causality of a phenomenon first?
83. What is with people who get mental illnesses, do they get to a stopping point?
84. Why is there not a stopping point in cognitive equilibration?
85. Why is cognitive equilibration so important?
86. What is meant by equilibration?
87. How does new knowledge raise new problems?
88. Give an example of any knowledge and a new problem?

89. Does the gaining of knowledge solve the create and solve problems?
90. Experimental sciences refer to which subjects in your mind?
91. Cause of the causality is referring to what?
92. Finished structure?where does this fit in ?please explain in simple language
93. Substructures?Is there not a less mechanical description of this word?
94. Does it mean that it means the same topic?
95. What is this positive force that you mention?
96. Are you saying that knowledge is Infinite?
97. Can you explain what the experimental sciences are?
98. Cause of the causality sounds confusing, what do you actually mean by this?
99. What experimental sciences?
100. What is regulation?
101. Who participated in the experiment?
102. Who are you addressing with this article?
103. What is equilibration?
104. What is regulation?
105. What does knowledge raise?
106. Give an example of experimental sciences?
107. What does sensori-motor mean?
108. How is intelligence defined?
109. When do we have that stage of intelligence?
110. Is sensori-motor intelligence more like an unconscious state of mind, if it rests mainly on actions, on movements and perceptions without language?
111. How do we coordinate these actions? how do we learn them at first?
112. Pulling a carpet to bring an object within reach constitutes a schema- that sounds like animals have that kind of intelligence?do they?
113. What is the study of regulation ?Who is involved in it?Where did it come from?
114. What is cognitive equilibration?
115. How is equilibration achieved in three forms when in fact it is always exceeded?Is that not a contradiction?
116. Why does equilibration have three forms?
117. What hierarchic level do schemes and sub schemes exist on?
118. Why are the totalities superior?
119. What is the study of regulation?
120. What is equilibration?
121. Is there another way of defining the three forms?
122. What is a stopping point?
123. What is knowledge?
124. What is knowledge?
125. What is knowledge?
126. What is knowledge?
127. What exactly is cognitive equilibration?
128. What is meant by assimilation and accommodation?
129. What are integrations?
130. what is accommodation
131. Explain the concept of accommodation?
132. Is it possible to only assimilate, and then to accommodate much later?
133. Why does accommodation fit so well into this context?
134. How do these "exchanges or interactions" occur?
135. Are we aware that they are occurring?
136. How can you differentiate something that you cannot foresee?

137. Unforeseen aspects means hopes, possibilities, or what?
138. What determines knowledge?
139. What happens if the exchanges are not accommodated? Is this knowledge then lost?
140. Why assimilation and accommodation so fundamental?
141. How do you accommodate the structures to the unforeseen aspects?
142. Can knowledge be assessed?
143. Can knowledge be transferred?
144. How is the knower and the object interrelated?
145. When does the knower assimilates objects?
146. Schemes and sub schemes are psychology related, but how and please simplify it for me?
147. How can we construct knowledge?
148. How is equilibration achieved?
149. How does any knowledge raise new problems as it solves preceding ones?
150. Define equilibration in simple English?
151. To what schemes or sub schemes are referred to ?
152. If any knowledge raises new problems as it solves preceding ones begs one to ask why do we endeavor to solve the initial question?
153. If we talking about human interaction and the process of thinking why not some user-friendly terms? Is this integrations in greater structures
154. Are you arguing that knowledge is hierarchical?
155. Does equilibrium constitute a stopping point?
156. What is knowledge?
157. What are the educational implications of viewing knowledge as actively constructed?
158. How is knowledge constructed?
159. What is equilibration?
160. How is equilibration achieved?
161. What are the stages of development?
162. What characteristics egocentric thought?
163. Why are concrete operational children able to conserve?
164. How does a person develop knowledge?
165. What processes are involved in the development of knowledge?
166. How would you define knowledge?
167. How does intelligence develop in infants?
168. How do infants learn about their world?
169. What constitutes a schema?
170. What are operations?
171. What is association?
172. What is the relationship between assimilation and accommodation?
173. Who is an organism?
174. What is an organism?
175. How would the organism and the environment interact to construct knowledge?
176. What is assimilation?
177. What is the function of accommodation?
178. What are the unforeseen aspects of reality?
179. What are schemes?
180. What is a hierarchic level?
181. How would schemes integrate into superior totalities?
182. Why is equilibration never complete?
183. What force drives equilibration?
184. How would you investigate Piagets claims?
185. What is sensori motor intelligence?

186. What are schemata of action?
187. How are schemata of action applied to new situations?
188. How does knowledge develop?
189. What is compensation?
190. When was Piaget born?
191. What methods did Piaget use to study the development of intelligence?
192. Who were Piaget's subjects?
193. How does compensation operate?
194. Why should you compensate for external disturbances?
195. How does activity enable you to compensate for external disturbances?
196. What is reversibility?
197. What are the processes of intelligence?
198. How do intelligent processes function?
199. What are the products of intelligence?
200. What role does cognitive conflict play in the development of knowledge?
201. What role does reversibility play in equilibration?
202. What are the operations of intelligence?
203. How can an action be internalized?
204. What does it mean for an internal action to be reversible?
205. Why operations are never isolated?
206. What are structures?
207. How does Piaget define intelligence?
208. How would operations integrate into inclusive structures?
209. What force drives equilibration?
210. Explain how knowledge is determined by interaction between the organism and the environment?
211. How are accommodating and differentiating linked?
212. How is the term causality used in relation to these sciences?
213. When does accommodation happen?
214. What is accommodation?
215. What do you understand by the process of accommodation?
216. How is accommodation different from assimilation?
217. Why is accommodation part of learning?
218. How is it that accommodation is a part of learning?
219. What does Piaget mean by accommodation?
220. Accommodation means what?
221. What happens in accommodation?
222. What is it to accommodate?
223. Can you tell me more about accommodation?
224. Can you explain accommodation?
225. How do we accommodate as part of learning?
226. Why does accommodation help to explain learning?
227. How does accommodation help us to understand learning?
228. How come accommodation tells us how people learn?
229. Explain the term knowledge?
230. Explain the term knowledge?
231. Explain the term knowing?
232. what is accommodation
233. What is cognitive conflict?
234. What is scaffolding?
235. What is assimilation?

236. What interaction is referred to?
237. How do you equilibrate?
238. What is the difference between structure and knowledge?
239. What are the schemes and the sub-schemes?
240. What is meant by schemes and sub schemes?
241. How is differentiation defined?
242. What are senses?
243. What is cognitive equilibrium?
244. What is the causality of a phenomenon?
245. What is a hierarchic level?
246. What are structures and sub structures?
247. The text on "Equilibration," speaks about schemes and sub-schemes. Please elaborate?
248. What is association?
249. According to Piaget, how is knowledge determined?
250. What similarities are there between theory and practice?
251. Are exchanges and interactions the same thing?
252. What is cognition?
253. What is the definition of knowledge?
254. What are schemas?
255. How does the person differentiate at the same time?
256. Can a learner differentiate if he is not ready for the new knowledge?
257. Between their differentiations and their integrations into superior totalities. "What on earth does this mean?"
258. What are structures and sub structures?
259. What is EQUILIBRATION?
260. What if you planned an interaction with this end in mind "the learner had to gain new knowledge" and no interaction takes place because of some other obstructions?
261. How can a state of equilibrium be exceeded?
262. Do socio-economic conditions impact on cognitive development and if so how?
263. What is equilibration?
264. What is Accommodation?
265. What is the difference between assimilation and accommodation?
266. What is a stopping point?
267. What's the difference between a theory and a theorem?
268. What are superior totalities?
269. What is the difference between assimilation and accommodation?
270. What if there is no desire from the learner who has to assimilate new information to acquire new knowledge?
271. What is the fundamental difference between assimilation and accommodation?
272. What are schemes and sub schemes?
273. How did Piaget influence learning, ie, the pedagogic implications of theory
274. What is accommodation?
275. What is assimilation?
276. What is equilibration?
277. What is knowledge
278. who is the knower
279. Explain the term assimilation?
280. Structures are mentioned. Explain these structures
281. What is assimilation?
282. Must the knower lead the learner to the unknown and leave him there until he or she discovers the new information?



283. Besides reading notes and reference books what else can I do to distinguish between assimilation and equilibration?
284. What is equilibration?
285. Are you referring to learning experiences people encounter? What interaction is referred to?
286. What is an example of an unforeseen aspect of reality?
287. When do we equilibrate?
288. What is knowledge
289. who is the knower
290. explain the term assimilation
291. How does one differentiate structures?
292. What is cognitive equilibration?
293. How can I make my class balance?
294. What is knowledge
295. who is the knower
296. What are operations?
297. What is knowledge according to Piaget?
298. What are objects?
299. How is knowledge constructed, in simple terms?
300. why is assimilation and accommodation important in cognitive development
301. What are structures or schemas and the difference with operations?
302. Are you referring to learning experiences people encounter? What interaction is referred to? How do human beings construct knowledge? How can you assimilate?
303. Are you referring to learning experiences people encounter? What interaction is referred to? How do human beings construct knowledge?
304. Can I say that organization and adaptation is the same as assimilation and accommodation?
305. What is an example of a structure of action?
306. What is the study of regulation?
307. explain the term causality
308. Are you referring to learning experiences people encounter? What interaction is referred to? How do human beings construct knowledge? How can you assimilate? How do you assimilate and accommodate simultaneously?
309. What is equilibration?
310. What is meant by equilibration?
311. What is equilibration according to Piaget?
312. Besides reading notes and reference books what else can I do to distinguish between assimilation and equilibration?
313. What is equilibration?
314. Which are the three forms of equilibration and how can these be used in the cognitive development?
315. Why does Piaget make his own words, namely genetic epistemology?
316. Why are the terms, assimilation and accommodation not used by other psychologists, they come up with other terms like conceptual growth or change?
317. What is the difference between a substructure and a greater structure?
318. What is a substructure?
319. What does it mean when a state of equilibrium is exceeded, does this mean it can be the opposite of exceeded? not sure what the word is for that
320. What is knowledge?
321. Distinguish among assimilation, accommodation and equilibration
322. Is cognitive conflict good?
323. I didn't know equilibration happened in three forms, what exactly is a form?
324. What is a positive force?

325. I have never come across the term hierarchic level in Piaget, What does this mean, and did he come up with this himself?
326. What is regulation?
327. what exactly does Piaget mean by encounter?
328. How is integration defined?
329. What is the difference between an exchange and an interaction?
330. Distinguish between 'differentiation' and 'Integration'.
331. What methods would you use to teach mathematics to children of 7 to 11 years according to Piaget?
332. What is an exchange?
333. What is knowledge
334. who is the knower
335. Explain the term assimilation
336. Structures are mentioned. Explain these structures
337. What is equilibrium
338. What is knowledge
339. Give two situations where each of the complementary processes, assimilation and accommodation take place without the other
340. What is meant by regulation
341. Can I say that organization and adaptation is the same as assimilation and accommodation?
342. What is maturation?
343. What is knowledge?
344. What is intelligence?
345. Where does knowledge come from?
346. What is causality?
347. What influences intelligence?
348. What happens if a child does not progress?
349. If equilibration never achieves even a temporary stopping point, how then is it attainable? If it is attainable then must achieve even a momentary stopping point -temporary.
350. How is equilibration achieved?
351. What is equilibration?
352. Why is Piaget considering the appearance of symbolic functions in the preoperational stage so important for intellectual?
353. What is cognitive equilibration?
354. Can you assimilate without accommodating or vice versa?
355. Explain the term equilibration
356. Who is PIAGET?
357. What is the meaning of stopping point?
358. What is accommodation?
359. Give an example of equilibration.
360. What is a state of equilibrium?
361. Give an illustrative example to show that accommodation and assimilation are complementary
362. What is meant by the term object of permanence?
363. What is scaffolding?
364. What is knowledge?
365. I understand equilibration to be a balance between assimilation and equilibration. So how do or can a person prove whether cognitive development never took place or rather developed slowly?
366. Can you perhaps give an example of a substructure, and then an example of a greater structure?
367. The last section on Piaget's theory on the construction of knowledge, i.e. to the unforeseen aspects of his reality"please explain this?
368. Please explain equilibration by means of an example.

369. Please explain what 'subject' and 'object' means.
370. Is there an easier-in a language that I can understand way of explaining what equilibration is?
371. Are operations and actions the same?
372. Give an illustrative example to show that assimilation and accommodation are complementary.
373. What is Centration?
374. What is equilibration, in simple terms?
375. What is the difference if any, between the knowledge acquired under conditions of disequilibrium and that acquired under condition of equilibrium?
376. Why is the relation not a simple association?
377. What does it mean when Piaget says that knowledge is determined by the interaction between the organism and the environment?
378. Can I say that organization and adaptation is the same as assimilation and accommodation?
379. Equilibration forms the balance in the thought of an individual, what happens if there is no equilibration?
380. What happens if there is no equilibration does it mean that a child is a slow learner?
381. How does the knower assimilate objects to the structure of his actions?
382. Could one refer to sub structures as a new environment to which existing structures are exposed?
383. Give me an example of states equilibration that are exceeded.
384. What is cognitive equilibration?
385. What superior totalities are you referring too?
386. Give me an example of the schemes and sub schemes referred to in the text.
387. What is the study of regulation?
388. What is the definition of equilibration?
389. What is accommodation?
390. Briefly describe what you understand by equilibration?
391. Why does equilibration never have a stopping point?
392. If the construction of knowledge is not determined by only the knower but also by the objects which are experiencing the subject matter, how will the pupil realize that his existing knowledge can be expanded to greater knowledge about the same object?
393. How can i make my class balance?
394. I do not understand what is meant by equilibration
395. How equilibration does happen?
396. What influences intelligence?
397. Is IQ the sample of intelligence?
398. Tell me how equilibration is achieved?
399. What is assimilation?
400. How is equilibration different from accommodation and assimilation?
401. Is the knower the teacher?
402. How can equilibration be achieved?
403. Give three illustrative examples to clarify the difference between assimilation and accommodation



Ask?



Search



View



Responses



FRQ

## TODAY'S TASK

There is 1 question waiting for response. View Now!


## Interactive Question Listing

### 1. The Constuction of Knowledge

2003-05-12 16:48:45.167685

#### How does equilibration happen?


Knowledge is not determined strictly by the knower, or by the objects known, but by the exchanges or interactions between the knower and the objects (between organism and the environment). The fundamental relation is not one of simple association but of assimilation and accommodation; the knower assimilates objects to the structures of his actions (or of his operations), and at the same time he accommodates these structures (by differentiating them) to the unforeseen aspects of the reality, which he encounters.  
Piaget, 1992

 This is when you are satisfied that you understand a concept. Cognitive conflict appears when new knowledge appears and it is in conflict with what i know

Respond

2003-05-12 16:48:45.167685

#### How does equilibration happen?

 This is when you are satisfied that you understand a concept. Cognitive conflict appears when new knowledge appears and it is in conflict with what i know. Until you assimilate and accommodate these concepts you will not be in equilibration

Respond

2003-04-28 14:51:44.669356

give an illustrative example to show that accommodation and assimilation are complementary

 Read the example in Ginsburg and Oppen relating to the

2. Equilibration digestive system

Respond

The study of regulation has shown us how equilibration is achieved in its three forms: between the subject and the objects, between the schemes or sub schemes on the same hierarchic level, and between their differentiations and their integrations into superior totalities. We must stress that cognitive equilibration never achieves a stopping point; even on a temporary basis, and that this situation is not to be regretted. The fact that states of equilibrium are always exceeded is the result, on the contrary, of a very positive force. Any knowledge raises new problems as it solves preceding ones. This is evident in the experimental sciences where the discovery of the causality of a phenomenon raises the question of the cause of the causality and so forth. By no means does an equilibrium constitute a stopping point, since any finished structure can always give rise to new requirements in fresh substructures or to integrations in greater structures (Piaget, 1977:11-12)

2003-03-24 15:33:53.152365

why is piaget consider the appearance of symbolic functions in the preoperational stage so important for intellectual?

I do not uunderstand this question?

Respond

2003-03-24 14:56:30.436088

What is menat by the term 'object of permanence?

The term 'object permanence' refers to the fact that a child begins to perceive that objects continue to exist even when they are no longer visible; that is, objects have an existence that is separate from the child's perception. This generally tends to happen towards the end of the sensori-motor stage

Respond

2003-03-24 14:56:30.436088

What is menat by the term 'object of permanence?

Yes, I agree that object permanance is that.

Respond


2003-03-19 14:33:51.424739

What is scaffolding?


How would you relate scaffolding and Vygotsky's ZPD? MJB

Respond

A black rectangular button with the text "Go back" in white, bold, sans-serif font.**2003-03-19 14:33:51.424739****What is scaffolding?**

 is the process whereby the teacher provides model structures that enables the pupils to apply existing skills in a new ways in th ppropriation of new knowledge.

**2003-03-19 14:33:51.424739****What is scaffolding?**

 Scaffolding refers to various techniques used to bridge the gap between what learners know and can do independently and what they come to know with the guidance of a more skilled partner (sometimes a peer or, more generally, a teacher or parent figure). You can think of scaffolding in the following way: when one builds a house, one uses a scaffold to prop up the house, gradually, as the house takes shape, the scaffolds are removed. Well, the same thing happens in education; when a child begins to solve new problems, they may need a lot of scaffolding to guide their problem solving activity (the teacher may break the task up into manageable 'bits'; she may do the task with the child, prompting their activity etc); however, as they become more proficient, they require less scaffolds and consequently, the teacher begins to withdraw the scaffolds.

**2003-03-19 14:33:51.424739****What is scaffolding?**

 What are Model Structures

**2003-03-19 14:33:51.424739****What is scaffolding?**

 What exactly are model structures

**2003-03-19 14:33:51.424739**


**What is scaffolding?**

 **What is meant by 'model structures'?mjb**

**Respond**

**2003-03-19 13:51:34.974501**


**What is knowledge?**

 **This is a HUGE question: let's narrow the answer to what Piaget thinks knowledge is: he believes that we construct knowledge through acting on our environment; through a TRANSACTION with the environment. When we ASSIMILATE AND ACCOMMODATE we construct mental STRUCTURES. So for Piaget, knowledge is the construction of mental schemes/cognitive structures. These structures are constructed by the functions of intelligence: assimilation and accommodation.**

**Respond**

**2003-03-19 13:50:35.695253**


**Where does knowledge come from?**

 **Knowledge is everywhere. It is experienced through our senses. Some knowledge we are born with while other knowledge we experience as we grow.**

**Respond**

**2003-03-17 17:12:50.349191**

**Is IQ the sample of intelligence ?**


 **Definately not, Your IQ only shows what you know up until the point your IQ is tested. Intelligence describes your potential. TLC**

**Respond**


**2003-03-17 17:12:50.349191**

**Is IQ the sample of intelligence ?** **No****2003-03-17 17:12:23.973863**

**If equilibration never achieve even a temporary stopping point, how then is it attainable? If it is attainable then must achieve even a momentary stopping point -temporary.**

 **Think of the example we used of climbing stairs; we are continually equilibrating. So, you need to think of equilibration as a dynamic force, a motor which drives our learning.****2003-03-17 17:10:25.949166**


**I understand equilibration to be a balance between assimilation and equilibration. So how do or can a person proof whether cognitive development never took place or rather devloped slowly?**

 **Ok, first of all, NOTE that equilibration is a balance between ASSIMILATION AND ACCOMMODATION; second, we cannot ever say that cognitive development does NOT take place; of course it always does. It is not exactly clear what you mean, in the second part of your question; whether cognitive development happens quickly or slowly doesnt effect HOW it happens, i.e. through accommodation, assimilation and equilibration. Probe me in class if this answer isn't satisfactory****2003-03-17 16:58:52.408761**

**what is the difference if any, between the knowledge acquired under conditons of disequilibrium and that acquired under**




**condition of equilibrium?**

 It might help to not think of them as separate entities and to view them as part of a process-disequilibrium leads to equilibration-it is a continuous cycle. By trying to class them to rigidly one loses the very essence of these processes is lost.  
MJB

Respond

**2003-03-17 16:58:52.408761**


**what is the difference if any, between the knowledge acquired under conditons of disequilibrium and that acquired under condition of equilibrium?**

 Well, knowledge can only be acquired when there is disequilibrium; no knew knowledge is acquired when we are in a state of equilibrium

Respond

**2003-03-17 16:58:52.408761**

**what is the difference if any, between the knowledge acquired under conditons of disequilibrium and that acquired under condition of equilibrium?**

 When we are in a state of equilibrium,it means that there is now a balance between assimilation and accommodation and the new knowledge is now understood.It is when we have to change our existing knowledge to accommodate the new information,that we find ourselves in a state of disequilibrium (cognitive conflict).When we adapt to accommodate(balance) this new info.we construct knowledge.

Respond

**2003-03-17 16:58:52.408761**

**what is the difference if any, between the knowledge acquired under conditons of disequilibrium and that acquired under**


**condition of equilibrium?**

 You mean... no NEW knowledge in a state of equilibrium TLC

Respond

**2003-03-17 16:56:30.854713**


**What is Centration?**

 A child that only focusses on one aspect of a situation.  
Example is when a child has to choose equal amounts of coke from different looking glasses.

Respond

**2003-03-17 16:56:30.854713**

**What is Centration?**

 is the tendency to focus on the most salient aspect of whatever one is trying to think about.

Respond

**2003-03-17 16:56:30.854713**

**What is Centration?**

 the child centers on a situation as he perceives it

Respond

**2003-03-17 16:56:30.854713**


**What is Centration?**

 the child focusses on a situation as he perceives his point of view

Respond

**2003-03-17 16:56:30.854713**

### What is Centration?

 this is when a child can only concentrate on one aspect of a situation

Respond

2003-03-17 16:56:30.854713


### What is Centration?

 this is when a child's attention is only focussed on one aspect of a situation

Respond

2003-03-17 16:55:51.514856

### What influences intelligence? 4 what happens if a child does not progress?

 I understand that maturation is one of the processes that influences intelligence. According to me I think intelligence is influenced by many factors such as specific heredity and general heredity. And if a child does not progress it is clear that the child has not matured biologically.

Respond

2003-03-17 16:54:54.105286


### What is cognitive equilibration?

 equilibration is the balancing of assimilation and accommodation

Respond

2003-03-17 16:54:42.590287


give two situations where each of the complementary processes, assimilation and accommodation take place without the other

 as they are complementary they do not occur without each other if we are talking about cognitive development; however, Piaget does indeed mention that assimilation can occur on it's own as can accommodation (say a child imitating clapping without understanding its meaning). Note, though, that for our purposes i.e. our understanding of this course on cognitive development and learning, these two processes occur at the same time.

Respond

**2003-03-17 16:54:42.590287**


**give two situations where each of the complementary processes, assimilation and accommodation take place without the other**

 Well, according to Piaget, assimilation and accommodation are ALWAYS complementary; so are you perhaps asking for an example of HOW they occur in one event? Let's think of a baby who handles a rattle for the first time; they are able to assimilate various things (they have a grasping schema; sucking schema etc. which they apply to the rattle). However, while the baby is sucking the rattle, the rattle makes a noise; this is something new that hasn't happened with other things that the baby has grasped and sucked before- SO this experience ADDS new information to the baby's existing structures, changing the baby's existing knowledge.

Respond

**2003-03-17 16:54:28.131162**

**Briefly describe what you understand by equilibration?**

 Ah, this is a VERY broad question! Equilibration is the balance between assimilation and accommodation; it is the dynamic force which drives learning; when faced with cognitive conflict, we are forced to equilibrate, to achieve balance between assimilation and accommodation.

Respond

**2003-03-17 16:54:28.131162**

**Briefly describe what you understand by**

## equilibration?

 equilibration is where there is imbalance in the aquisition of knowledge

Respond

2003-03-17 16:53:34.803521

## What influences intelligence?

 maturation

Respond

2003-03-17 16:53:34.803521


## What influences intelligence?

 The environment;genetics;maturation

Respond

2003-03-17 16:52:20.462695

## What is knowledge?

 This is a HUGE question: let's narrow the answer to what Piaget thinks knowledge is: he believes that we construct knowledge through acting on our environment; through a TRANSACTION with the environment. When we ASSIMILATE AND ACCOMMODATE we construct mental STRUCTURES. So for Piaget, knowledge is the construction of mental schemes/cognitive structures. These structures are constructed by the functions of intelligence: assimilation and accommodation.

Respond

2003-03-17 16:52:19.895726

## Why do equilibration nerver have a stopping point?

 because new knowledge is always acquired, that is, never

ending

Respond

**2003-03-17 16:52:19.895726**


**Why do equilibration nerver have a stopping point?**

 because we are always coming across knowledge.

Respond

**2003-03-17 16:52:19.895726**


**Why do equilibration nerver have a stopping point?**

 The entrance of a new knowledge calls for further challenges. In other words new knowledge brings in disequilibrium, with the result that the knower is always in a learning mood. T.A.

Respond

**2003-03-17 16:52:19.895726**

**Why do equilibration nerver have a stopping point?**

 Think of the example of climbing stairs, equilibration never reaches a stopiing point because we are always balancing assimilation and accommodation.

Respond

**2003-03-17 16:52:10.915421**


**Give an example of equilibration.**

 This is your task! So i'll wait a while before i answer this one!

Respond

**2003-03-17 16:51:40.122497**


### How can equilibration be achieved?

 again i would say that equilibration could also be achieved by giving learners practical example which they are familiar with. By so doing it make them to assimilate and accommodate at the same time.

Respond

2003-03-17 16:51:40.122497


### How can equilibration be achieved?

 Equilibration can be achieved when there is a balance between assimilation and accomodation

Respond

2003-03-17 16:51:40.122497


### How can equilibration be achieved?

 In order to achieve a balance, we need to rely on resources to overcome cognitive conflict; these resources can be people, books or our own actions.

Respond

2003-03-17 16:51:40.122497


### How can equilibration be achieved?

 We agree that equilibration cannot be achieved, even on a temporary basis. An individual drifts towards equilibration in their learning experiences as the complementary processes of assimilation and accommodation interplay. The new knowledge creates cognitive conflict, taking the individual to a new cognitive level, with new challenges.

Respond

2003-03-17 16:51:40.122497

### How can equilibration be achieved?

 with the right amount of assimilation and accomodation, but it is only reached for a moment, because equilibration never "stops"

Respond

**2003-03-17 16:51:37.981604**


**What is maturation?**

 maturation is the maturing of the human body.

Respond

**2003-03-17 16:51:26.23495**

**What does it mean when a state of equilibrium is exceeded, does this mean it can be the opposite of exceeded? -not sure what the word is for that**

 Ok, when equilibrium is exceeded, it means we are in a state of DISEQUILBRIUM; we are not longer able to equilibrate and need to have resources in order to do so.

Respond

**2003-03-17 16:51:09.81403**

**What is equilibration, in simple terms.**

 is compensation for an external distribution or self-regulation

Respond

**2003-03-17 16:51:09.81403**

**What is equilibration, in simple terms.**

 it is a balancing of assimilation and accomodation

Respond

**2003-03-17 16:50:51.521784**



### What is intelligence?

 Intelligence is something that allows an individual to adapt to the world psychological level

Respond

2003-03-17 16:50:51.521784


### What is intelligence?

 It is also the potential to learn

Respond

2003-03-17 16:50:27.768456


### What is knowledge according to Piaget?

 This is a HUGE question: let's narrow the answer to what Piaget thinks knowledge is: he believes that we construct knowledge through acting on our environment; through a TRANSACTION with the environment. When we ASSIMILATE AND ACCOMMODATE we construct mental STRUCTURES. So for Piaget, knowledge is the construction of mental schemes/cognitive structures. These structures are constructed by the functions of intelligence: assimilation and accommodation.

Respond

2003-03-17 16:50:18.727813


### What is equilibration?

 A concept used to describe cognitive development. It's important to maintain an equilibrium for cognitive growth. Also it is balance between Assimilation and accommodation.

Respond

2003-03-17 16:49:40.205449


### What is accommodation?

 **Accommodation occurs if one cannot make sense of new information by using existing knowledge. It results in one changing one's understanding to make sense of the new information.**

Respond

**2003-03-17 16:49:40.205449**

**What is accommodation?**

 **If information is so foreign that one cannot assimilate it then one must change their existing understanding in order to make sense of the new information**

Respond

**2003-03-17 16:49:40.205449**

**What is accommodation?**

 **Is changing the existing cognitive structures to adapt to the challenges of new information to fit in the existing knowledge.**

Respond

**2003-03-17 16:49:39.636327**


**What is cognition?**

 **Cognition refers to activities like thought or reasoning.**

Respond

**2003-03-17 16:49:38.280279**


**Can you assimilate without accomodating or vice versa?**

 **One should not think of accomodation and assimilation as one process that happens before the other. They happen simultaneously and both is needed.**

Respond

**2003-03-17 16:49:20.95281**

**What is assimilation?**

 **Assimilation is making sense of new information by using existing understanding.**

**2003-03-17 16:49:20.95281**

**What is assimilation?**

 **Assimilation is new information is acquired in terms of old information**

**2003-03-17 16:49:20.95281**

**What is assimilation?**

 **this is when one makes sense of new information by using existing information**


**2003-03-17 16:48:45.152941**

**What are schemas?**

 **Schemas are actions**

**2003-03-17 16:48:22.818614**


**1 can I say that organisation and adaptation is the same as assimilation and accommodation?  
2 equilibration forms the balance in the thought of an individual, what happens if there is no equilibration?**

 Not exactly; what you could say is that assimilation and accommodation are the functions of intelligence that enable us to adapt to the world.

Respond

**2003-03-17 16:48:22.818614**


**1 can I say that organisation and adaptation is the same as assimilation and accommodation?  
2 equilibration forms the balance in the thought of an individual, what happens if there is no equilibration?**

 Yes, you can. If there is no equilibration, the individual will never learn anything new; will never progress or develop cognitively.

Respond

**2003-03-17 16:47:05.103839**

**Who is PIAGET?**

 He was genetic epistemologist, who theorized on the cognitive development of children. He wasnt an instructional theoretician like Vygotsky, who was commissioned by the communist party to study learners' problems.

Respond

**2003-03-17 16:47:05.103839**

**Who is PIAGET?**

 piaget is a theorist who researched the thoughts of children and adults

Respond

**2003-03-17 16:47:05.103839**

**Who is PIAGET?**

 **Piaget is NOT a contemporary epistemologist.**

**Respond**

**2003-03-17 16:45:47.116661**

**What is a state of equilibrium?**

 **it is a balance between assimilation and accommodation.**

**Respond**

**2003-03-17 16:45:47.116661**

**What is a state of equilibrium?**

 **It is the balance between assimilation and accommodation**

**Respond**

**2003-03-17 16:45:14.500554**


**How is equilibration different from accommodation and assimilation?**

 **equilibration is the balance between assimilation and accommodation. it is a dynamic force.**

**Respond**

**2003-03-17 16:44:54.694321**


**What is knowledge who is the knower explain the term assimilation structures are mentioned.Explain these structures What is equilibrium**

 **I have already answered the first question (see What is knowledge?). The answer to your second question is: EVERYONE!! Anyone who is acting on the world in order to construct knowledge is in the process of becoming a "knower" (see What is equilibrium?)**

**Respond**


**2003-03-17 16:44:50.839859**

**Are you referring to learning experiences people encounter? What interaction is referred to? How do human beings construct knowledge? How can you assimilate? How do you assimilate and accommodate simultaneously?**

 **An interaction (or transaction) happens between the child and the world; the child acts on the world in order to know it and the world constrains or allows certain actions.**

**2003-03-17 16:43:56.240473**

**give three illustrative examples to clarify the difference between assimilation and accommodation**

 **A child in Tutume in Botswana sees water when its being bathed. It assimilate that this is a colourless liquid and tasteless. There is not much accomodation. The child may go with the mother to fetch water at a nearby stream. The child assimilate that water comes from a stream and accomodate that a stream is larger than a bath. There isnt much profound cognitive shift. One day the mother decide to take the child to Cape Town and they stay at Sea Point. The child is flabbergasted by what he sees. Whats this huge rolling water. He has never seen anything like this. The Water is blue and its moving. The child has never seen such a vast expanse of water. The child can assimilate very little. There is huge accomodation. The child cognitive structures have to shift hugely. This thing is not that stream in the bush back home. This is called the sea. The child might move close to the shallow part and play a little with the water. Oh God! the water is salty unlike the water back home. The is accomodation. This is learning and this has huge pedagogic implications.**

**2003-03-17 16:43:56.240473**

**give three illustrative examples to clarify the difference between assimilation and**

**accommodation**

 I wanted to be rated on this response- pliz.

Respond

**2003-03-17 16:42:59.590188**


**what is accomodation?**

 When new information conflicts with what we already know (existing knowledge) We change and expand to existing structures.

Respond

**2003-03-17 16:42:31.316623**


**Are you refering to learning experiences people encounter? What interaction is refered to?How do human beings construct knowledge?How can you assimilate?**

 An interaction (or transaction) happens between the child and the world; the child acts on the world in order to know it and the world constrains or allows certain actions.

Respond

**2003-03-17 16:41:42.023489**

**Are you refering to learning experiences people encounter? What interaction is refered to?How do human beings construct knowledge?**

 An interaction (or transaction) happens between the child and the world; the child acts on the world in order to know it and the world constrains or allows certain actions.

Respond

**2003-03-17 16:41:35.116372**


**What are operations?**

 When schemas regulate thought, they are called operations

Respond

**2003-03-17 16:41:33.092303**


**1.how can i make my class balance? 2.i do not understand what is meant by equilibration**

 Ok, i think what you're asking here is how you can strike a balance of equilibrium amongst your class? This is a VERY intersting question and we will be dealing with it in class; it's a little long for me to write the answer down just yet:-) (see What is equilibration? for the 2nd question)

Respond

**2003-03-17 16:41:33.092303**


**1.how can i make my class balance? 2.i do not understand what is meant by equilibration**

 Ok, i think what you're asking here is how you can strike a balance of equilibrium amongst your class? This is a VERY intersting question and we will be dealing with it in class; it's a little long for me to write the answer down just yet:-) (see What is equilibration? for the second question)

Respond

**2003-03-17 16:39:07.401413**

**Why is the relation not a simple association?**


 This is a complex question, which we will answer as we go through the course; basically, what Piaget is alerting us to is that learning is not simply explained by saying that we associate one thing with another and then learn; he is alerting us to the fact that learning (in the sense of cognitive growth/developing cognitive structures) requires assimilation and accommodation; simple association is NOT enough to explain this complex process.

Respond

**2003-03-17 16:39:04.129429**



**are operations and actions the same?**

 **Yes, EXCEPT that operations are mental actions (such as adding 2 + 2 in your head) while schemas refer to external actions; the point is, that operations are actions.**

Respond

**2003-03-17 16:39:02.058189**


**can I say that organisation and adaptation is the same as assimilation and accommodation?**

 **Not exactly; what you could say is that assimilation and accommodation are the functions of intelligence that enable us to adapt to the world.**

Respond

**2003-03-17 16:38:37.203498**


**Is the knower the teacher?**

 **Goodness, if ONLY we WERE the knowers of everything:-) No, actually, anyone who is acting on the world and constructing knowledge is in the process of becoming a knower; what Piaget refers to here as the knower, is the child. But all of us are in the process of becoming knowers.**

Respond

**2003-03-17 16:38:30.73644**


**can I say that organisation and adaptation is the same as assimilation and accommodation?**

 **Not exactly; what you could say is that assimilation and accommodation are the functions of intelligence that enable us to adapt to the world.**

Respond

**2003-03-17 16:38:23.975815**


**What is an example of a structure of action?**

 An action schema would be something like a baby who has learnt to grasp: whenever the infant grasps something, they are using the grasping schema (sucking in order to discover something about the world is also a schema).

Respond

**2003-03-17 16:38:05.489746**


**What are structures or schemas and the difference with operations?**

 Structures contain information about the world; they are constructed through activity and they represent different fields of knowledge that the child constructs throughout development. Schemas are 'bits' of knowledge- they make up structures and are the building blocks of intelligence; they refer always to ACTIONS. Operations are schemas that regulate thought.

Respond

**2003-03-17 16:38:01.488468**


**why is assimilation and accommodation important in cognitive development**

 Well, these are the FUNCTIONS OF INTELLIGENCE. They are the processes by which we develop cognitively, according to Piaget. So, without them, we would not develop cognitively! Hence they are CRUCIAL to cognitive development.

Respond

**2003-03-17 16:37:31.867503**

**If the construction of knowledge is not determined by only the knower but also by the objects who are experiencing the subject matter, how will the pupil realize that his existing knowledge can be expanded to greater knowledge about the same object?**


 First of all, what do you mean by "Objects who are

experiencing the subject matter"? Are you suggesting that the pupils are "objects"? If so, this is not strictly the sense that Piaget means when referring to objects; for him, objects are actual empirical objects, 'things' that exist in the world that can be manipulated and can manipulate activity, such as a table. etc. The second part of your question is interesting; do you think that pupils are unaware of the fact that they can learn more? Do you think they 'know' that they 'don't know'? This is interesting because I think that we often do NOT know that there is something we don't know, hence we need to be guided (mediated to). For Piaget, equilibration is the dynamic force that tells us that there is something we don't know; it makes us feel uncomfortable and 'pushes' us to discover new knowledge to overcome the disequilibrium we feel. I hope this is helpful; please write more interesting questions!

Respond

**2003-03-17 16:36:55.378377**


**What is the difference between an exchange and an interaction?**

 Good question; note for Piaget, they are SYNONYMOUS. That is, he uses them interchangeably, so there is NO difference between exchanges and interactions for Piaget.

Respond

**2003-03-17 16:36:32.671943**

**How is knowledge constructed, in simple terms?**

 For Piaget, knowledge is constructed through assimilation and accommodation. We act on the world and assimilate (or understand new knowledge in terms of existing structures) and accommodate (change our existing structures, if new knowledge conflicts with what we already know); these are FUNCTIONS of intelligence that lead to the STRUCTURES of intelligence.

Respond

**2003-03-17 16:36:00.038717**

**What is the definition of equilibration?**


 Equilibration is the balance between assimilation and

**accommodation. As we transact with the environment, we need to constantly balance assimilation and accommodation, so that we are in equilibrium.**

Respond

**2003-03-17 16:35:53.667968**


**what are objects?**

 **Objects are those things that exist in our environment; we transact with objects within our environment (such as the computer) in order to construct knowledge about our world. We act on these objects and they in turn, constrain our activity. (For example, because a wall is solid, it allows me to perform certain actions on it, but it constrains other types of actions).**

Respond

**2003-03-17 16:27:15.989619**


**give an illustrative example to show that assimilation and accommodation are complementary.**

 **Can you give an example? Why not think of an example like digestion (i.e. this is a concrete example to illustrate how assimilation and accommodation are complementary). Can anyone help here? If not, i'll give you the answer in a few days.**  
joanne

Respond

**2003-03-05 10:37:17.57213**

**What is assimilation?**

 **Understanding new information in hte world in terms of existing knowledge. It is a function of intelligence**

Respond